

Electric Boat Receives Order For 8th Trident

The U.S. Navy on January 7th awarded Electric Boat a \$401 million negotiated fixed-price, incentive-profit contract for the eighth Trident missile firing submarine, SSBN 733.

The shipyard has the first seven Tridents under construction. The lead ship, *Ohio* (SSBN 726), will start sea trials early this year. The second, *Michigan* (SSBN 727), was launched last spring, and the third will be christened this summer.

The 560-foot, 18,750-ton Tridents, larger than World War II cruisers, will each carry 24 Trident I missiles compared with the 16 missiles on currently operating Poseidon missile submarines.

Each Trident will be manned by a crew of 154.

Pomona Viper Antitank Missile Shoulder-Fired

Viper, a short-range, unguided antitank weapon developed by Pomona, was successfully shoulder-fired for the first time in December.

The firings took place at the U.S. Army's Missile and Munitions Center and School at Redstone Arsenal, Ala., to determine the safety of the weapon.

In other firings which proved the accuracy of Viper, gunners fired 24 rounds against stationary steel targets simulating tanks, resulting in 24 hits, each of which would have destroyed or disabled an armored vehicle.

In the next series of tests at Redstone, approximately 146 environmentally conditioned rounds will be fired from stationary mounts against steel plates representing tanks.

Early this year, soldiers will shoulder-fire Viper for the first time during operational tests at Fort Benning, Ga. The soldiers will fire approximately 750 rounds against steel targets, moving tanks and other targets.

Viper will give soldiers immediate defense against modern tanks and armored vehicles.

The Viper system consists of a rocket packaged in a telescoping fiberglass launcher. The tactical rocket consists of the warhead and propulsion sections. The launcher, which contains the sights and firing mechanisms, also serves as the system's handling and storage container. It is discarded after firing.

The low weight of Viper—approximately eight pounds—permits it to be easily carried and employed by individual soldiers in full combat gear.

The Army is expected to award the first production contract to Pomona this year. Production will be located in the division's Camden, Ark., facility.

Social Security Tax Deductions Increase

Employee pay checks in 1981 will show reductions as the new rate for Federal Insurance Contributions Act (FICA or Social Security) increases for all covered employees.

Fears that the Social Security System was running out of money prompted the Congress to raise the employee and employer contributions in several steps. For 1981, the payroll deduction increases from 6.13 percent of the first \$25,900 of annual income to 6.65 percent of the first \$29,700.

Under the former scale, the maximum deduction for 1980 was \$1,587.67. The new maximum Social Security deduction will be \$1,975.05 per employee.

GD World

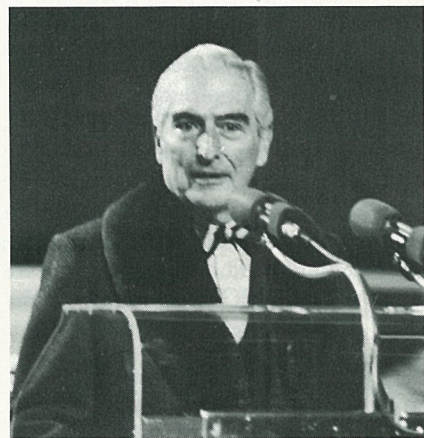
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Secretary of Navy Calls EB Bastion of National Security

During launching ceremonies of Baltimore at Electric Boat, Secretary of the Navy Edward Hidalgo spoke briefly about the shipyard and its workers. His remarks follow:

Before I exercise the great privilege of introducing our guest of honor and speaker today, I wonder if you will bear with me for two or three minutes while I convey a little special message that is very much on my mind, and if you don't mind sentiment from a Hispanic, it's really a parting message for me.



Edward Hidalgo

Right here where we find ourselves assembled today, we have the bastion—one of the great bastions of our national and military security. That's a very dramatic thing to stop and think about. And why is that so? It is so in the first place because it is one of the greatest shipyards in the world—not just in our nation, but in the whole world. And why is it a great shipyard?

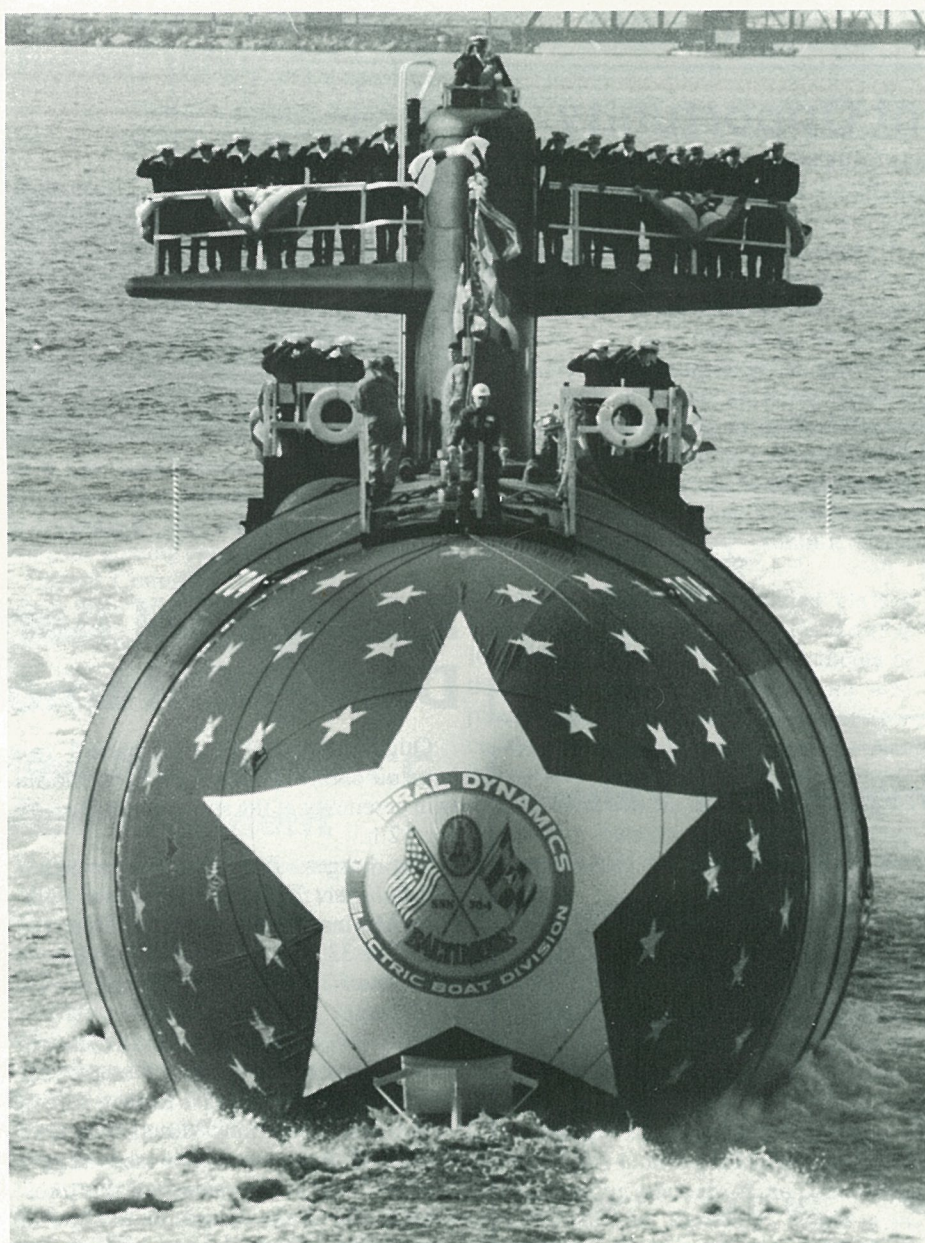
Well, there are many elements here that you know as well as I—the incredible facilities, the response of the dynamism of our free enterprise system, and I put right at the top of the list,

the great work force of this shipyard about which I have talked on prior occasions. And on prior occasions I have referred to that work force as the unsung heroes of our national security, and I mean every word of it.

It is great because of the management that leads this shipyard—both here and at General Dynamics. It is great because of the collaboration and the close coordination with my wonderful Navy—the way we work together. Now none of those elements singly would be meaningful. They are meaningful and cogent only when they come together in a closely unified integrated effort—tightly, very tightly drawn, with huge understanding and with huge motivation.

The second part of my message is: I think it is well for us to realize that all our dreams, all our ambitions, all our fulfillments are not unopposed. There has been quite an avalanche of this opposition lately—in the media and elsewhere—and I say to you that all that opposition, those who do not wish us well, would do well to understand that we are going ahead and succeed not only in spite of, but because of their opposition and because of their irresponsible criticism. They want us to fail—we shall not fail. And that will be the galvanizing force for that unified effort.

I close this little message by that wonderful refrain of, "A man's reach must exceed his grasp, else what's a heaven for?" Well, the reach here is going to be mighty long.



... Two, One, Launch! The fast-attack submarine Baltimore (SSN 704) slides into the Thames River after being christened during ceremonies at Electric Boat.

Congresswoman Holt Christens USS Baltimore

Electric Boat launched its 12th 688-class fast-attack submarine December 13th at Groton amidst praise for the shipyard and its workforce and concern about the strength of U.S. naval forces.

In the ceremony, thousands of employees and guests witnessed the 360-foot, 6,900-ton *Baltimore*, crew at attention on her deck and sail diving planes, slide stern first into the Thames River.

Moments before, U.S. Representative Marjorie S. Holt, Republican of Mary-



Baltimore Christened. U.S. Representative Marjorie S. Holt smashes a bottle of champagne on the bow plate of Baltimore (SSN 704) as U.S. Senator Charles McC. Mathias Jr. watches.

land, the ship's sponsor, had smashed a bottle of champagne against *Baltimore's* bow plate, signalling Edward P. Sullivan Jr., a Sheet Metal General Foreman at EB, to throw the trigger, releasing the sub for her slide.

Representative Holt was the first woman elected to Congress from Maryland in a general election. She is currently serving her fourth consecutive term.

She is a member of the House Armed Services Committee and the ranking Republican on both the Personnel and Procurement and the Military Nuclear Systems Subcommittees.

The praise at the ceremonies for *Baltimore* (SSN 704) came from Secretary of the Navy Edward Hidalgo. The 5,000 guests and spectators on hand heard him call Electric Boat "one of the great shipyards of the world..." and refer to its employees as a "great workforce" and the "unsung heroes of our national security." (The full text of Secretary Hidalgo's remarks appears at left.)

The concern was expressed by U.S. Senator Charles McC. Mathias Jr., Republican of Maryland, who was the principal speaker at the event. Senator Mathias, his state's senior senator and dean of its Congressional delegation, said, "As we send *Baltimore* down the ways, we send it to join a fleet dangerously short of ships and of personnel... into a world dangerously long on problems.

"Our lifelines are stretched to every corner of the globe," Mathias continued, noting that the U.S. Navy is half the size it was 10 years ago. "It doesn't take much imagination," he went on, "to figure out what kind of shape we'd be in if those lifelines were cut. Obviously today, as never before, we depend on the sea for our security and our survival."

Also participating in the ceremonies was Baltimore Mayor William D. Schaefer.



Taurus Leaves Indonesia with a Load of LNG for Japan

Taurus Grounding Proves Quincy LNG Design

A Quincy-built LNG tanker recently withstood a four-day grounding on a reef off the coast of Japan without losing any of her cryogenic cargo. Probably no other LNG tanker design could have survived this accident without losing some or all of her cargo. The following article by Staff Writer Jim Reyburn describes what happened:

It was the sort of night sailors have nightmares about – pitch black with a howling wind gusting to 80 knots whipping up to 18-foot seas.

It was a night to be on shore, not at sea. But last December 12th, *Taurus*, Quincy Shipbuilding's seventh in a series of ten giant liquefied natural gas (LNG) tankers, had a cargo to deliver. She was approaching the coast of Honshu Island, Japan, nearing her unloading point at Tobata toward the end of a five-day voyage from Bontang, Indonesia. It was the 28th trip for the 936-foot, 95,000-ton vessel since her delivery in August 1979.

Taurus wouldn't deliver her cargo for another four days. Instead, she was destined to severely test the integrity of Quincy's design and the craftsmanship that went into her construction. Aborting her approach to the harbor because of the raging weather, she ground to a halt on a reef during a wide turn. The rocky bottom holed four of her ballast tanks and bent two of the blades on her 26-foot diameter propeller.

Attempts to get *Taurus* off under her own power were unsuccessful. The crew

then dropped her anchor, and "ballasted down" (pumped more water into ballast tanks) to hold her securely on the bottom. *Taurus* sat there, buffeted by the high winds and seas. Later in the day, she tried again to get off, but failed.

By the next day, Energy Transport Company of New York, the ship's operators, had hired a Japanese salvage company to assist. By late that day, six large 3,000-horsepower tugs were standing by. The wind still shrieked and powerful seas were battering *Taurus*' port side. Repeated attempts to free *Taurus* on successive high tides failed.

After two more days, the wind and seas calmed. The third day, the decision was made to lighten the ship. Some 4,000 tons of fuel oil were pumped onto small ships alongside. At the same time, large compressors brought to the scene pumped air into the holed ballast tanks, forcing the water out.

Tuesday, December 16th, at about 4:30 p.m., the efforts paid off. With tugs lending a hand, *Taurus* broke free into open water. She remained at anchor

overnight, then proceeded under her own power to Tobata for offloading. It was the 100th unloading at the Tobata terminal by a Quincy-built tanker since they started delivering LNG to Japan in 1977. (All told, *Taurus* and seven of her sister ships had made more than 330 round trips to Japan by the end of 1980; each vessel carries enough LNG to heat an American city of 500,000 for a month.)

During her unloading, divers surveyed the damage. They found it more extensive than earlier inspections had indicated.

Most important, *Taurus* had not lost a drop of her cargo from her five large cargo spheres. The cargo containment system had not been damaged in any way.

That was perhaps the most glowing tribute to the Quincy design. The geometry of the sphere system and the structural strength of the hull (including the "double bottom" between the cargo holds and the bottom shell of the ship) combined to do just what they were designed to do in a collision or grounding – keep the ship and its cargo safe and intact.

During the ordeal, *Taurus* had done more than live up to her design safety standards. She not only had survived (not

unscathed; she's now in drydock to have 70 percent of her bottom shell replaced), but also had proven her rugged ability to take the worst the elements had to dish out.

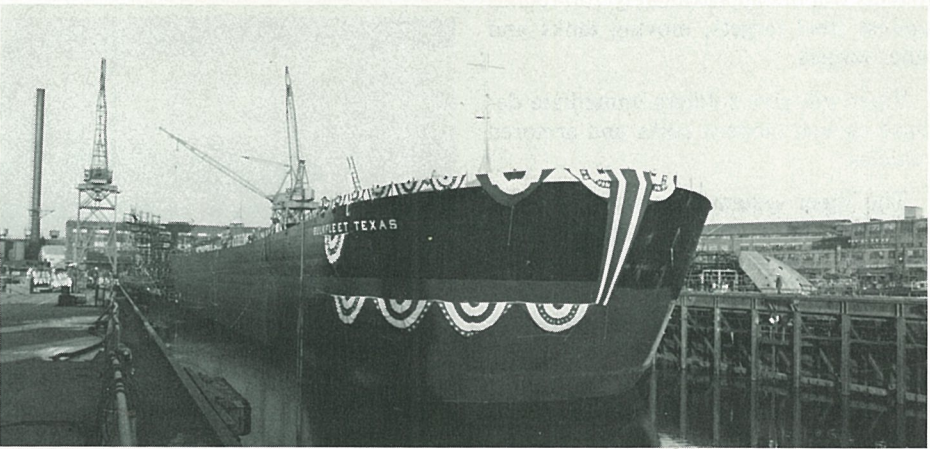
Taurus' performance throughout the ordeal has evoked compliments from her operators:

"I was very impressed with the structural integrity of the ship," said Chief Engineer Ed Jacobsen, who made repeated interior hull inspections when the ship was aground. "There was no evidence of racking (twisting) at all."

Greg Masaitis, Energy Transport's Vice President of Operations, echoed those sentiments: "We were greatly impressed with the strength and rigidity of the hull," he said.

Taurus will be laid up for three months or more being repaired.

"That may seem like a fairly long time," says Quincy's Harry Peterson, Director of Post-Delivery Engineering, "but the fact remains that the ship took a real beating, withstood it well, and proceeded to port under her own power. That has to be the best testament to the know-how of the design and construction force here at Quincy."



Ready to Go. Bulkfleet Texas, one of two oil-carrying barges christened at Quincy Shipbuilding on December 12th, rests in a yard construction basin. The barges, built for Bulkfleet Marine Corp., each have a capacity of 210,000 barrels of petroleum products.

2 Large Oil Barges Christened During Ceremonies at Quincy

Quincy Shipbuilding christened two large oil-carrying barges during a colorful twin ceremony at the shipyard on December 12th.

The barges, *Bulkfleet Pennsylvania* and *Bulkfleet Texas*, were built for Bulkfleet Marine Corporation of Houston, Tex. The 33,400-ton vessels each have a capacity of 210,000 barrels of petroleum products.

While a crowd of several hundred invited guests and shipyard employees looked on, Mrs. James N. Brown, wife of the Marine Operations Manager of Gulf Oil Co.-U.S., cut a ribbon activating a mechanical arm that smashed the traditional bottle of champagne on the bow of the *Bulkfleet Pennsylvania*.

Minutes later, Mrs. J. Barry Snyder, wife of Bulkfleet's President and Chief

Executive Officer, snipped another ribbon to christen *Bulkfleet Texas*. Mr. Snyder was the principal speaker at the ceremony.

The barges were floating bow to bow in one of the shipyard's huge construction basins.

Representing General Dynamics in the ceremony were David S. Lewis, General Dynamics' Chairman and Chief Executive Officer; P. Takis Veliotis, Executive Vice President-Marine, and Gary S. Grimes, Quincy Shipbuilding Division General Manager.

Also on hand for the event was Buck Miller, President of Gulf Oil Company-U.S.

Construction of the barges began last May; they will be used for coastal transportation of refined petroleum products.

Equal Employment Opportunity

Equal Employment Opportunity continues to be an important and integral part of our management philosophy at General Dynamics. We recruit, hire, train and promote persons in all job classifications without regard to race, color, religion, sex, age or national origin and base decisions on employment so as to further the principle of equal employment opportunity. We will discharge, as well, our obligations with respect to the handicapped and veterans. It is our job to insure that all personnel actions will be executed and administered on that basis.

As a result of our policy and practice of according Equal Employment Opportunities to all, we have made significant progress in increasing the representation of minority groups and women at all levels throughout the company. We must continue our commitments to Affirmative Action at every General Dynamics operation and facility and see to it that equal opportunity exists in fact as well as in policy. I am committed and I expect all members of our management team to be similarly committed.

D.S. Lewis

David S. Lewis
Chairman

Savings And Stock Investment Values

Below are the Savings and Stock Investment Plan unit values for November:

Salaried	Oct. 1978	Oct. 1979	Oct. 1980
Government Bonds	\$2.0607	\$2.2579	\$2.4446
Diversified Portfolio	1.2643	1.5903	2.2015
Fixed Income	--	1.0393	1.1448
Hourly			
Government Bonds	2.0598	2.2579	2.4424
Diversified Portfolio	1.2928	1.6272	2.2462
GD Stock	\$14.9500*	\$23.7100*	\$40.3750

*Reflects 2½ for 1 stock split of February 1979 and 2 for 1 stock split of November 1980.

Fort Worth Teams Cameras and Computers For Exacting Inspections of F-16 Assembly Jigs

Aircraft component assembly jigs, some of which have to be accurate to within 10 one-thousandths of an inch, traditionally have been painstakingly inspected by hand with master gauges.

These periodic inspections resulted in production delays and down times even if the assembly tools retained their original tolerances and no adjustments were needed. Now, at Fort Worth inspections of the F-16 wing and vertical fin assembly jigs take far less time and often work can continue without stopping or slowing production.

The change comes through the use of photogrammetry, or making reliable measurements with photographs. These photos, coupled with easily recalled computer data, can quickly be taken and read with virtually no interference of the master gauge or production line.

Photogrammetry, which involves multiple photographs taken by one camera or the use of a stereocamera arrangement, is not new, although its use in the aircraft industry is just now beginning. Prior to the industrial applications, the major use of photogrammetry was in aerial mapping and reconnaissance.

Then, less than a decade ago, photogrammetry was applied to the measurement of shapes of aircraft models in wind tunnels. This involves marking target points at various geometric areas on the model, photographing from different angles and keeping a permanent record.

Through use of a stereocamera arrangement and an image reader, a three-dimensional measurement is obtained.

Because of that measurement capability, "we realized the cost impact that could be gained by applying photogrammetry to production," says Jerry K. Beamish, Program Manager in the Aerospace Test Laboratory at Fort Worth, who has pioneered the industrial applications of photogrammetry.

After study under an Independent Research and Development (IRAD) program, the first direct application of photogrammetry to industry was in making periodic inspections for production tooling.

In fabricating major components such as wings, an assembly jig or fixture must be made to exacting tolerances. From these assembly jigs, the wings are fabricated. The jigs must be examined regularly to assure geometric stability and dimensional integrity.

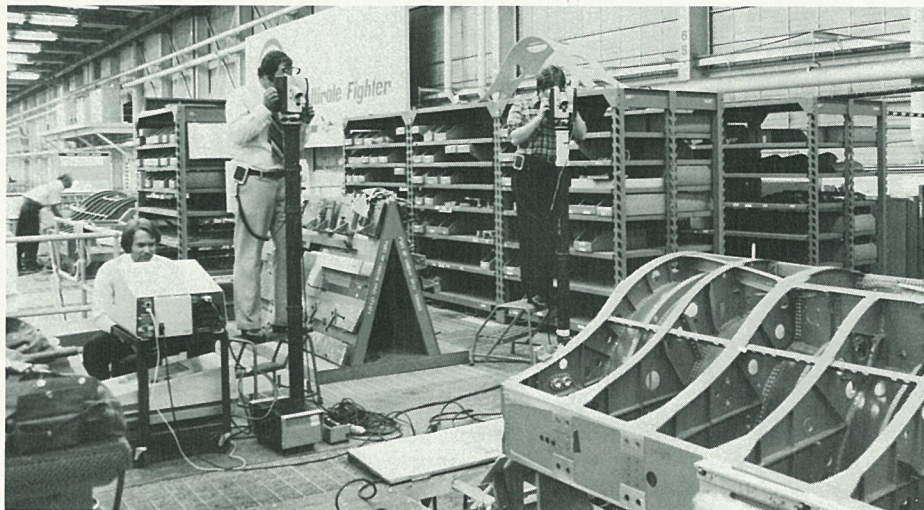
Mugavero Named Com Dev Division General Manager

Richard J. Mugavero, a Vice President of General Dynamics Communications Company (GDCC), has been appointed Vice President and General Manager of Com Dev Division in Sarasota, Fla. He will continue reporting to William M. Lombardi, President of GDCC.

Com Dev, a manufacturer and distributor of telephone information management systems, was acquired by GDCC early last year. Its principal products include the ACCOUNTANT, a monitoring device for developing records that indicate who placed long distance calls, where, when and for how long, and CALL-QUEST, which furnishes reports defining telephone usage and costs.

Mugavero, who joined GDCC in 1974, has been a Vice President of the company since 1976.

He earned a Bachelor of Business Administration degree in 1960 from Michigan State University, East Lansing, Mich., and served four years as a contracting officer in the U.S. Air Force.



Theodolite Inspection. Steve Rathburn (at lower left) monitors a microcomputer while David Brantley and Eric Ericson (right) operate theodolite cameras in an in-process inspection of an F-16 center fuselage. The inspections can be made without slowing down production.

The wing assembly tool is checked for a tolerance of 10 one-thousandths of an inch, a thickness equal to three sheets of typing paper. Early in production, the assembly tools for major components, such as the wing and vertical fin, must be checked after completion of five ship sets. Well into production, the checks may come after every 20 ship sets.

"This checking builds confidence in the stability and integrity of the component," Beamish says.

A wing assembly jig which is needed to fabricate the 150-square-foot F-16 wing has about 100 target points which can be read from photographs in about eight hours using photogrammetry. That same inspection, under the old process, would have taken 24 hours.

Photographs taken with the photogrammetric cameras are analyzed by an operator through a film reading system, although an automated reader is expected to be operational within a year. The target points are read from the glass plates onto which the filmed images were made and transmitted to a microcomputer which computes and compares present inspection data with the master shape.

Fort Worth Wins United Way Award

A Fort Worth-prepared videotape showing the benefits of contributing to the Tarrant County United Way has been judged the best of its category by the United Way of Metropolitan Dallas.

The videotape, entitled "One Hour's Pay," was prepared by Fort Worth's multi-media department for the Contrib Club. It was shown to division employees and to workers from many other firms in Tarrant County during the United Way's annual fund drive last year.

The Contrib Club, made up of division employees who voluntarily contribute, has pledged to give nearly \$1.4 million during the coming year to the United Way of Tarrant County.

Four men in the multi-media department worked on the 12-minute videotape. They were Jerry Price, Scott Davis, Greg Hubbard and Ron Bradley.

Pew Named GDCC Vice President

Douglas J. Pew has been promoted to Vice President and General Counsel of General Dynamics Communications Company (GDCC). Previously, he was GDCC's General Counsel. Pew will be responsible for the legal affairs, including the supervision of contract administration of the company and its subsidiaries.

Before joining GDCC in 1977, Pew was securities counsel for the 7-UP Company in St. Louis for seven years. He was also in private practice.

Pew received his Bachelor of Arts degree in 1964 and a Juris Doctor (law) degree in 1967, both from Washington University in St. Louis.

"Photogrammetry satisfies all F-16 production tolerances," Beamish says.

Through a related process, using a theodolite, both the original control geometry and the photogrammetry results can be tested against each other to insure even greater checks and balances.

A theodolite is an instrument which measures both horizontal and vertical angles. It is considered more accurate than the photogrammetric camera technique, and, more importantly, two theodolites can be connected with a graphics microcomputer which provides instantaneous measurements. Azimuth and elevation angles from each theodolite are transmitted to the computer and software performs the triangulation computation. The three-dimensional coordinates are saved on magnetic tape.

Those triangular computations are compared with the original, and adjustments can be made if necessary.

"If something is wrong, we will know what is wrong and how much it is off," Beamish says.

"Basically, what this is is a three-dimensional inspection system that is extremely accurate and efficient."

Pomona Employees Earn MBA Degrees

Seven Pomona employees have earned Master of Business Administration degrees by completing a night education program at West Coast University in Los Angeles. The program began in the fall of 1976.

The graduates, who completed the required 48 hours by attending class one night each week, are: Jim Drake, Design Specialist; Irvin L. Farmer, Manager, Industrial Accounting; James L. Johnson, Group Engineer; Arthur H. King, Marketing Manager; James E. Kozyra, Marketing Manager; Charles A. Rue, Project Engineer; and Dale J. Weber, Project Engineer.

King was graduated Summa Cum Laude.

The seven students attended classes through the General Dynamics Tuition Reimbursement Program. The benefits of this program are available to all employees who take job-related courses for college credit at an accredited four-year institution. So far this year, approximately 350 employees are participating in the tuition reimbursement program at Pomona.

Bohle Appointed Convair Controller

Charles Bohle has been appointed Controller of Convair Division effective in January. He replaces David E. Cumbie, who is transferring to Pomona to be Director Operations Administration.

Bohle joins Convair from Xerox Corp. An engineering graduate of the University of California in Berkeley, Bohle also obtained a master's degree in finance from University of California at Los Angeles.

Stromberg DCO Capacity Enlarged By Improvements

Stromberg-Carlson has announced improvements to its System Century digital central office (DCO) which expand line and trunk capacity of the telephone switches, afford better reliability and allow telephone networks to be simplified.

The improvements enable increasing line capacity four-fold up to 32,400 lines and 4,080 trunks.

By using a new line switch frame, DCOs currently in service can be expanded and the frames used in a variety of network applications tailored to a customer's needs.

Telephone networks are simplified, and each network is controlled by a single set of call processors. In addition, maintenance and administration for an entire network is performed from a single location—reducing manpower and administrative costs and improving security and network performance.

Improvements Made To F-16 Flight, Fire Control Systems

F-16 aircraft now being delivered to the air forces of the United States and Israel have been enhanced by several hardware and software changes to the fire and flight control systems. The changes will be retrofitted to F-16s previously delivered and will be made to aircraft assembled in Europe beginning in March.

The changes include increasing the speed and capacity of the radar computer, adding more air combat modes in the fire control computer and modifying the head-up display to provide symbology for Sidewinder (AIM-9L) heat seeking missiles.

Harbison, Bracka Named To New Posts At Convair

R. C. Harbison has been named Director-Aircraft Engineering for Convair. In his new post, Harbison will report to G. E. Blackshaw, Vice President-Research and Engineering.

In a related action, B. W. Bracka has been promoted to Director-Structures and Design, the position vacated by Harbison. Bracka also will report to Blackshaw.

Harbison joined Convair in 1957 as a design engineer and has worked primarily in structural design and engineering. He has degrees in aeronautical engineering from the College of Technology, Belfast, Northern Ireland.

A native of Germany, Bracka received his degree in aeronautics and mechanical engineering from the Polytechnic Institute of Brooklyn, N.Y., and has been with Convair since 1956.

Rector to Head Space Programs

William F. Rector has been appointed Vice President and Program Director-Space Programs at Convair.

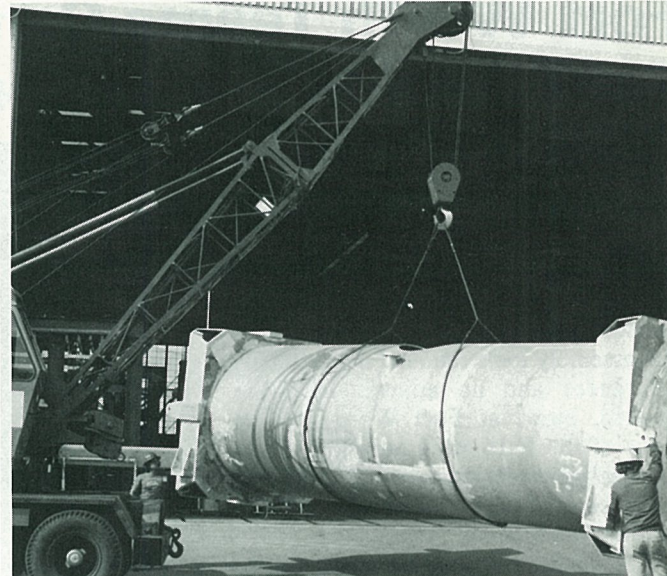
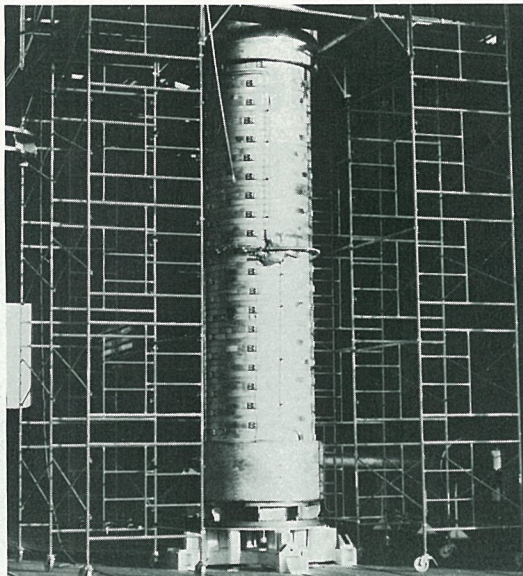
In this position he will be responsible for all space-related programs including the Atlas and Centaur launch vehicles and advanced space studies for NASA and the Department of Defense.

Rector began his career at Convair in 1956 on the Atlas and Centaur programs and later was named a project engineer specializing in manned space systems. In 1962, he joined NASA as Project Officer for the Lunar Module in the Apollo Spacecraft Office. He also served as Manager of Payloads Definition on the Skylab Program.

In 1966, he joined TRW as Manager of Manned Space Systems supporting the development of Spacelab in Europe and payloads in the United States. He was Manager of Manned Space Systems and Space Transportation System Applications when he rejoined Convair earlier this year as Director of Advanced Space Programs.

GD World

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Magnet Progress. A superconducting preprototype magnet system being built for TRW by Convair is shown in various stages of assembly. At left, the superconductor being wound on a cylinder; at center, the magnet in the upright position with aluminum tension bands and structural end caps in place; and at right, a vacuum vessel built at Quincy Shipbuilding's Charleston Facility at Charleston, S.C. The

superconducting magnet will be placed in the vacuum vessel early next month. The 37-ton magnet and supporting subsystems will be delivered to TRW in May. Additional superconducting magnet work is in progress at Convair, which includes a new contract to build 18 magnets for the Lawrence Livermore National Laboratory Mirror Fusion Test Facility.

Convair Awarded \$31.3 Million Magnet System Contract

Convair has received a \$31.3 million contract for superconducting magnet systems for the Lawrence Livermore National Laboratory Mirror Fusion Test Facility.

Under the 42-month contract, Convair will design and build 18 magnets that will provide the intense magnetic field required to contain hot gases at the density and temperature needed for fusion reaction.

When the test facility is operational in 1985, Lawrence Livermore will use it to prove the scaling laws for mirror fusion to a size and configuration practical for power generation and to advance the technologies of mirror fusion devices.

Teamed with Chicago Bridge and Iron, Convair will build three different superconducting coils for the facility. Included are: 14 solenoid magnets measuring 18-feet in diameter, two transition magnets 11-feet by 18-feet and two other magnets

spanning 31-feet in diameter. When completed the total magnet system for the facility will weigh more than 800 tons.

Work on the magnets will be performed at Convair's Harbor Drive Facility, as well as at Plant 19 where an automated assembly line for large coil magnet winding is already in operation. Chicago Bridge and Iron will fabricate structural components at its Salt Lake City facility and ship them to San Diego for final assembly.

The Mirror Fusion Test Facility program is Convair's second major award for multiple production of superconducting magnets. The division was recently selected to design, build and test 40 superconducting magnets and the operating electrical system for the Elmo Bumpy Torus fusion reactor program for which McDonnell Douglas is the prime contractor. Convair's share of that four-year program could approximate \$15 million.

Atlas-Centaur Boosts New Intelsat to Orbit

An Atlas-Centaur launch vehicle boosted the first of a new generation of international telecommunications satellites into orbit from Cape Canaveral, Fla. on December 7th.

The Intelsat V satellite has almost double the communications capability of early satellites in the Intelsat series, most of which were launched by the Convair-built Atlas-Centaur.

The Atlas and Centaur stages arrived at Cape Canaveral August 6, 1980. Six days later the Atlas was erected on the pad at Complex 36. On August 14th, the Centaur stage was erected.

The Intelsat V was first placed in a highly elliptical orbit. Two days after launch a solid propellant rocket motor attached to the satellite was fired to circularize the orbit at geosynchronous altitudes over the Equator. The satellite, which has a capacity of 12,000 voice circuits plus two television channels, is now on station over the Atlantic Ocean.

F-16 Begins Flight Test Program For Derivative Fighter Engine

A modified F-16 Fighting Falcon, the first fighter equipped with the new General Electric F101 Derivative Fighter Engine (DFE), has begun flight-test operations at Edwards AFB, Calif.

The aircraft, called the F-16/101, is undergoing a flight test program that is scheduled to be completed by June of this year. The first flight of the F-16/101 was made on schedule in late December with General Dynamics F-16/101 Program Test Pilot David R. Palmer at the con-

trols.

The new engine is derived from the engine which powers the B-1 bomber and produces approximately 26,000 to 28,000 pounds of thrust. It is being developed as a potential joint service alternative engine for advanced military aircraft under a contract sponsored by the U.S. Air Force and Navy.

In addition to Palmer, test pilots for the program include Air Force Lt. Col. Joseph W. Dryden and Capt. Greg Lewis.

Pomona's DIVAD Gun Completes Army Evaluation

Pomona's two Division Air Defense (DIVAD) gun system prototypes completed the U.S. Army's five-month-long Development Test/Operational Test (DT/OT) evaluation late last year. During the tests, the Pomona DIVAD destroyed a variety of targets, including subscale helicopter and fixed-wing aircraft, full-sized helicopters and jet aircraft.

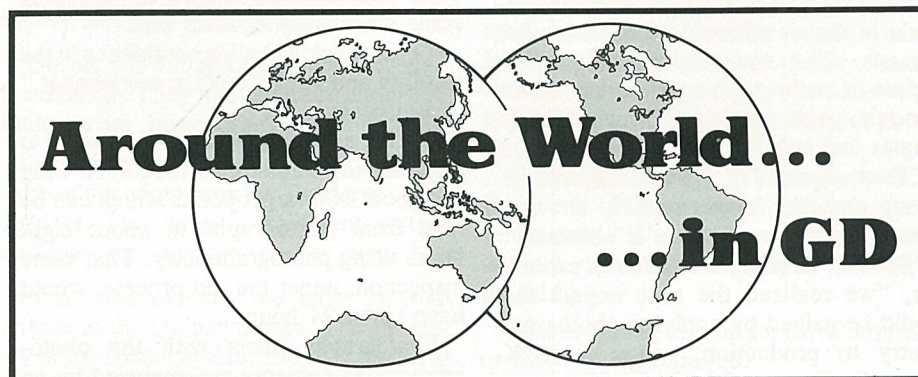
DIVAD is a radar-controlled air defense gun system mounted on a tank chassis which the Army plans to deploy worldwide with mechanized and armored divisions.

The Pomona DIVAD is competing with one designed by Ford Aerospace, which was also evaluated during the same five-month period.

D. L. McPherson, DIVAD Program Director, congratulated all employees for their support of DT/OT. That support, he said, "enabled us to finish this phase of development with strong results. The Army will certainly consider our good marks when evaluating the results of DT/OT."

In addition, the division has a number of on-going energy studies from the U.S. Department of Energy and is producing a preprototype superconducting magnet system for an isotope separation process for TRW, a magnet for a magnetohydro-

dynamic program at Stanford University contracted by the Francis Bitter National Laboratory at Massachusetts Institute of Technology, and a magnet for a large coil fusion program for the Oak Ridge National Laboratory.



CHQ: J. Crotty Kernan was promoted to Corporate Director, Financial Analysis.

Electric Boat: Gary E. Herzig was promoted to Supervisor of Engineering... Eric M. Salowitz to Chief of Nuclear/Waterfront Trade Planning... Joel P. Adams and Michael S. Campbell to Nuclear Test Supervisor... John P. Casey, Douglas D. Elliot, Paul R. Schmitz, David J. Huband and Robert D. Navin to General Foreman... Thomas E. Condon to Quality Systems Supervisor... Edward H. Hartley to Quality Assurance Supervisor... Carlton D. Jenkins and Donald E. Wittig to Test Operations Engineer... Earl R. Kupis Jr. to Educational Services Supervisor... Richard W. Lacroix and Roy J. Smith Jr. to Supervisor, Configuration Management... John S. Pfeifer to Assistant Superintendent... William A. Rummel to Supervisor, Quality Systems... Michael E. Scheffers to Chief, Administration... James E. Tarallo to Purchasing Agent... Robert L. Ucci to Administration/Control Coordinator... Timothy T. Beyer and George F. Bassett to Foreman... Richard P. Palmieri to Manager of Trade Planning... Lloyd T. Foley and Francis J. Miceli to Chief of Planning and Control... Richard F. Luzzi to Manager of Planning... James A. Sproul to Superintendent.

ATC: Richard Williams was promoted to Manager, Manufacturing... Zach Hovav to Manager, Engineering.

Electronics: William A. Carlson was promoted to Senior Manufacturing Engineer... Russell J. Gilbert to Systems Analyst Senior... Robert A. Gregory to Production Test Supervisor... Ray A. Izzarelli to Logistics Program Coordinator... Burt M. Rice and Francis E. Sablan to Planning Control Analyst Senior.

Convair: David M. Lemos was promoted to Program Administrator... David A. Swanson to Operations Supervisor, Production Engineering... Agnes A. Allgire to Operations Representative... James T. Ames to Superintendent... William Burbridge to Accounting Analyst-Senior... Charles H. Fontaine to Operations General Supervisor, Manufacturing Control... Harry E. Gaugh Jr. to Operations General Supervisor-Manufacturing... Thomas E. Johnson to Group Engineer... Mitchell B. Shapiro to Operations Supervisor-Manufacturing Control.

DSS: John W. Withers transferred from St. Louis to WDSC and was promoted to Manager-Systems Development and Programming.

Fort Worth: R. Armstrong and L. D. Simpson were promoted to Project Manager... G. J. Komechak to Assistant Project Engineer... W. A. Carter to Field Service Engineer, Senior... J. D. Cornelius to Engineering Administrative Group Supervisor... M. G. Coucke to Aerosystems Engineer, Senior... D. R. Cowart to Industrial Engineering Supervisor... F. A. Dixon to Inspection Supervisor... A. J. Duclos to Field Service Engineer... E. C. Gamblin to Administrative Assistant... D. R. Hawk to Project Coordinator... R. W. Heflin to Field Engineer, Senior... I. W. Hendrickson and T. L. Tapscott to Logistics Group Engineer... G. D. Higgins to Material Program Administrator... H. W. Johnson to Chief of Logistics... J. S. Jones and R. E. Sullivan to Tool Manufacturing Foreman... P. J. Podmers to Engineering Associate Analyst... J. M. Yankowski to Project Manufacturing Technology Engineer... J. O. Williams to Foreman... K. W. Watson to Product Specialist.

GDCC: C. Lyn Jordan was promoted to Sales Manager... Gary Rosenberg to Director of Production Engineering.

Datagraphix: Paul L. Adkins was promoted to Reclamation Manager... Richard L. Hurst to Manager, Material Operations... Michael J. Dedina to Group Leader-Audio/Visual... Jess J. Haire to Supervisor, Engineering Parts and Records... Edward B. Herron, Gordon A. Hofer and Gary S. Richardson to Supervisory Development Engineer... George J. Kosmak to District Sales Manager... Earl E. Sanders to Supervisor, Manufacturing.

General Dynamics Sales, Earnings Paced by Aerospace Divisions

General Dynamics announced its earnings for 1980 amounted to \$195 million, or \$3.58 per share, an increase of 5.3 percent over the record 1979 earnings of \$185 million, or \$3.43 per share.

Sales in 1980 were \$4.7 billion, 16.8 percent greater than the \$4.1 billion reported in 1979, the previous record year.

Earnings for the fourth quarter of 1980 were \$52.6 million, or 96 cents per share, on sales of \$1.3 billion, compared with earnings for the same period a year earlier of \$57.7 million, or \$1.07 per share, on sales of \$1.1 billion.

The 1980 and 1979 earnings each include investment tax credits of \$10 million, or 19 cents per share, attributable to the delivery of liquefied natural gas (LNG) tankers. The 1980 earnings reflect a benefit of \$5.5 million, or 10 cents per share, for the fourth quarter and \$11 million, or 20 cents per share, for the year, resulting from a permanent deferral of Federal income taxes on profits derived from certain export sales.

Funded backlog at the end of 1980 was \$10.4 billion, with total funded and unfunded backlog at \$11.2 billion.

David S. Lewis, Chairman and Chief Executive Officer, said that the substantially increased earnings from the company's government business were offset by a reduction in earnings from commercial operations which resulted from the difficult national economic conditions of

the past several months.

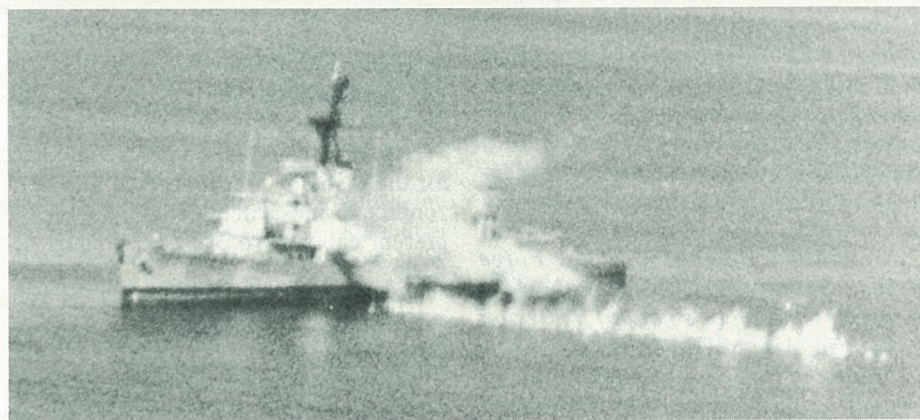
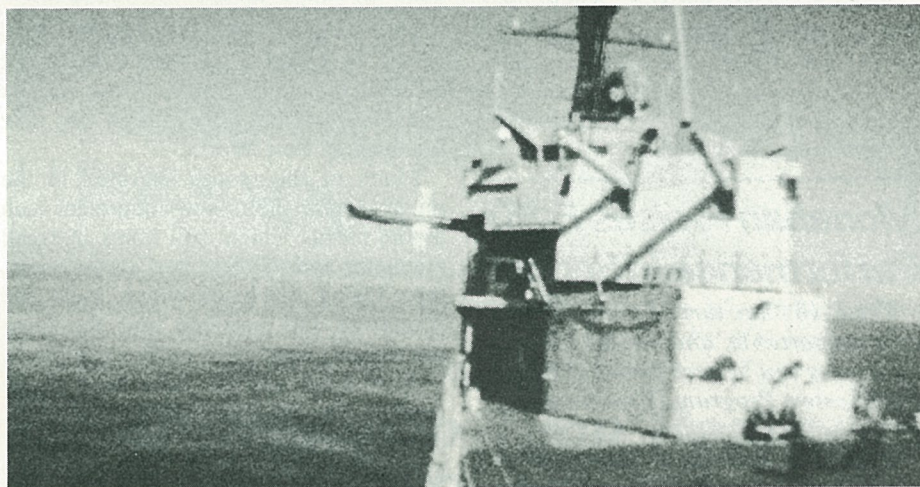
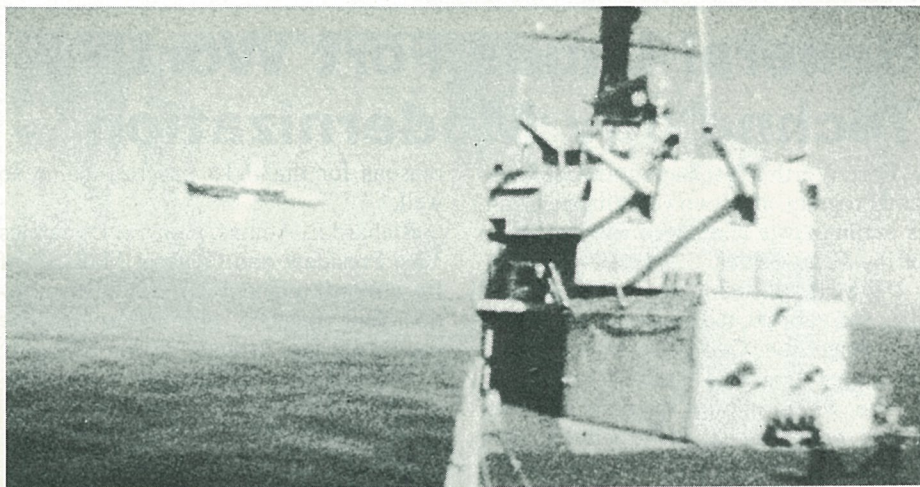
Net earnings for the aerospace group increased approximately 30 percent over 1979 as Fort Worth's F-16 program moved into higher rate production and some of the Pomona advanced missile and gun systems moved out of development into production, Lewis said. Earnings from commercial aircraft programs at Convair were lower than in 1979, primarily as a result of a slowdown in orders for DC-10 fuselages from McDonnell Douglas.

In addition to the high level of F-16 production activity, Fort Worth has embarked on two major company-funded efforts to broaden and extend the scope of the F-16 program. The F-16/79, powered by the General Electric J79 engine, has been designed for potential sale to countries not requiring the full performance capability of the standard F-16. This airplane has successfully completed its development program and is being evaluated by pilots from interested countries.

F-16XL Development

Development was started on a very advanced version of the F-16, called the F-16XL, which will have even better combat and operational characteristics than the highly successful F-16 now being delivered to the air forces of six countries. "We believe that the F-16 product line will attract more international sales and that the production life of this tactical

Continued on Page 4



Direct Hit. The final moments of a Tomahawk's flight are recorded by a 16 mm. high-speed motion picture camera mounted on a target ship (upper photos). The bottom photo was taken by Convair photographer C.N. DeMund from an aircraft.

Henry Crown Honored by Navy For Meritorious Public Service

Henry Crown, a member of the General Dynamics Board of Directors and Chairman of the Board's Executive Committee, received the Navy's Public Service Award during ceremonies at the Pentagon early in January.

The award, one of the Navy's highest civilian honors, was presented to Crown by Secretary of the Navy Edward Hidalgo.

The Secretary, in making the presentation, recognized Crown's leadership in American business and industry, his efforts in support of a strong national defense and his personal contributions to the naval service.

In a citation that accompanied the award, Crown, who attained the rank of colonel in the U.S. Army during World War II, was praised for his awareness "of the vital importance of sea power to national security and his instrumental part in developing a strong public and industrial base for meeting our nation's maritime requirements."

The citation took note of Crown's personal interest in the Navy's education

programs by establishing and supporting several Naval Reserve Officer Training Scholarship funds and Naval Academy Midshipmen programs in memory of his son, the late Robert Crown. Robert served in the Navy during World War II and after the war remained affiliated with the Naval Reserve and served as National President of the Navy League of the United States for which he was also recognized with the Navy's Public Service Award.

On hand for the ceremony were: Mrs. Henry Crown; General Dynamics Executive Vice President Lester Crown, and Mrs. Robert Crown.

Others attending the Pentagon ceremony were: Secretary of Commerce Philip M. Klutznick; W. Graham Clayton, Deputy Secretary of Defense; Adm. Thomas B. Hayward, Chief of Naval Operations; General Robert N. Barrow, Commandant of the Marine Corps; Vice Adm. E. B. Fowler, Commander of the Naval Sea Systems Command, and David S. Lewis, Chairman of General Dynamics.

Sub-Launched Tomahawks Hit Target Ships in Navy Tests

Two of three Tomahawk cruise missiles which were successfully launched from a submerged submarine off the coast of California last month scored direct hits on target ships.

The Tomahawk sea-launched cruise missiles (SLCMs) zeroed in on and hit target ships in the Pacific Missile Test Center's Sea Test Range, in combined development and operational tests.

During the planned attack phase in the third test, however, a difficulty was experienced and the missile's flight was command-terminated from the control center at Point Mugu. However, each test demonstrated the Tomahawk SLCM's long range, over-the-horizon capability to seek, find, and attack targets.

"This was a very ambitious and very important milestone in the SLCM program," said Bill Dietz, Vice President and Program Director - Cruise Missiles. "Readying the missiles for these tests required the efforts of a lot of people. The entire team deserves a pat on the back."

Dietz said that the tests were the first to be carried out entirely by the Navy. "We delivered the missiles, and they did the rest. They also deserve a lot of credit, because they did a terrific job," he said.

Frank Thompson, Program Director - Sea-Launched Cruise Missiles, was proud of the missiles' quality performance: "I can't overemphasize the importance of building quality into each missile," he said. "Although one of the missiles was terminated without hitting the target, we had two flawless missions and a third that completed a long and difficult mission with a single problem at the very end. These test results demonstrate that good, dependable, quality pays big dividends."

The Tomahawks flown in the tests were equipped with inert warheads and were launched from the nuclear-powered attack submarine USS *Guitarro* (SSN 665) while submerged in open water. The tests

were part of a series of four antiship development test/operational test (DT/OT) missions that are being conducted by the Navy. The DT/OT is a prelude to operational evaluation of the Tomahawk that will begin in early summer. Those tests of the Tomahawk antiship missile will involve eight flights, including several with live warheads.

Previous to the DT/OT phase of the SLCM program, the Tomahawk performed 20 antiship missions in which the missile overflew the target hulks on simulated target strikes.

Jacksonville Completes 1st Sea Trials

The *Jacksonville* (SSN 699), Electric Boat's seventh 688-class fast-attack submarine, successfully completed first sea trials late last month.

The exercise was "clearly among the best ever performed by any submarine," said L. E. Holt, EB's Assistant General Manager-Operations, who headed an EB team on the ship.

"The performance of the EB people aboard was tops," Holt continued, "and everyone involved with the trials and in the preparation of getting the ship to sea should feel satisfied with his performance." Holt also praised the Navy crew "for clicking off the events (trial exercises) one after the other."

A high ranking Navy official on board said *Jacksonville* is an "excellently built ship."

During the two days at sea, the crew of the 360-foot, 6,900-ton *Jacksonville* checked out the propulsion system and equipment and made test dives.

Electric Boat has already delivered five of the ships and has contracts for 15 more.



Naval Honor. Henry Crown and his wife, Gladys, display the U.S. Navy's Public Service Award which he received recently during a ceremony at the Pentagon from Secretary of the Navy Edward Hidalgo (right).

General Lauds Fort Worth's Technology Modernization

Fort Worth's Technology Modernization Program, after two years in operation, is cutting costs and speeding production of the F-16 fighter.

"We are excited about the progress to date and very excited about the potential," said Brig. Gen. George L. Monahan Jr., Air Force Program Director for the F-16.

The \$125 million capital improvements program was designed to make Fort Worth's 40-year-old plant more efficient in producing the U.S. Air Force's newest fighter. The new equipment added so far under the program includes computer-controlled robotic drills, numerical-controlled milling machines and composite tape laying machines.

Monahan Praises F-16's Performance In Service

The F-16 "has turned out to be very, very supportable, and I think General Dynamics can be very proud of it," the F-16 System Program Director said recently in Fort Worth.

Brig. Gen. George L. Monahan Jr., speaking to a group of GD and industry officials and military leaders (see story above), said, "The first F-16 unit in the U.S. Air Force has just been declared operationally ready."

"In (its qualifying) Operational Readiness Inspection, almost every area evaluated was either excellent or outstanding. That's really very rare."

Monahan said that U.S. Air Force F-16s regularly are exceeding the Tactical Air Command's goal of a mission capability rate of 70 percent.

"I look at this rate every day, and we are consistently up to 77 or 80 percent, and we even had a couple of days in the past month where we were up to 87 percent mission capable. That's a truly remarkable record."

The F-16s are being flown from three bases in the United States and from four in Europe and one in Israel.

With an expected production run of 1,388 F-16s, savings are expected to be more than \$370 million because of the modernization program.

"It's an excellent payoff for the future," said Gen. Monahan.

Speaking at the second annual F-16 Technology Modernization Review late last month, the general noted that most American industrial firms are operating in plants that are at least 20 years old. He added that modernization of the Fort Worth plant was one of the principal

GD Gifts to Colleges Pass \$1 Million Mark

During 1980, General Dynamics and its employees donated \$289,604 to colleges and universities — an increase of 17 percent over the previous year. Each dollar employees gave to institutions of their choice was matched by the corporation under the GD Matching Gifts Program.

Since the program was begun in 1975, General Dynamics and its employees have donated \$1,022,617 to institutions of higher learning.

Under the program, General Dynamics will match employee contributions from \$25 to \$4,000 in cash or securities.

reasons for the F-16 program going so well.

Richard E. Adams, General Dynamics Vice President and General Manager of Fort Worth, pointed out that modernization had speeded production as new equipment was brought on line.

"We are five aircraft ahead of schedule," he said. "Modernized equipment and technologies have been put into place with a favorable cost impact, and they have improved quality."

He said 72 of the 199 F-16s delivered to the U.S. Air Force are zero defect aircraft. General Dynamics has already committed about \$60 million for new facilities at Fort Worth.

Much of the money invested in the program has paid for new equipment such as the robots which drill holes in small aluminum and stainless steel access doors, tape laying machines which build the composite tail sections and the large numerically controlled milling machines.

Substantial savings have been documented: For example, 38,000 man-hours have been saved by the use of the five axis, three-spindle mills which are dedicated to the manufacture of 63 parts of the forward fuselage of the F-16. Use of the robots to drill fastener holes for the F-16 has increased productivity by a four-to-one factor.

New automated tape laying equipment for the manufacture of vertical and horizontal tail skins will more than double the present capacity to 315,000 pounds per year.

"The Technology Modernization Program has been profitable to the customer and to industry," Adams said.

The program at Fort Worth is unique in that it is a joint effort between the Air Force and industry.

It has been so successful, said Program Manager Mike Miller, that other similar programs are being developed for defense contractors and subcontractors. The program may also be expanded internationally; discussions have been held about similar programs with military and industrial leaders in Spain and Australia where the F-16 is a finalist in fighter aircraft competitions.

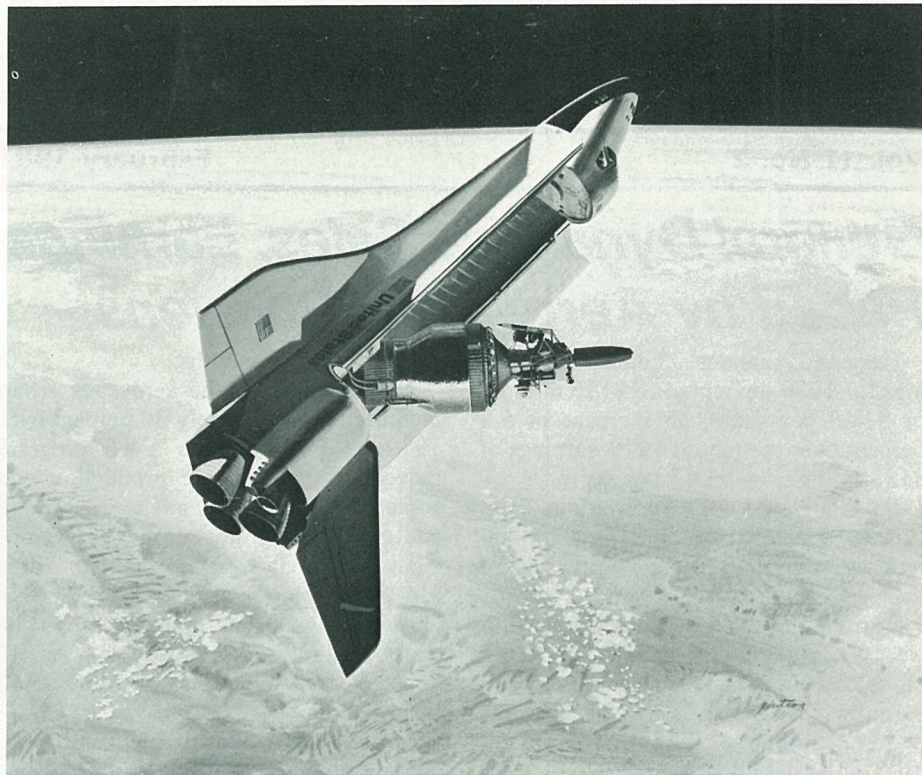
Convair Receives Boron Composite Army Contract

Convair's boron composites program received another boost recently with the award of a \$1 million development contract from the Army Materials and Mechanics Research Center, Watertown, Mass.

The three-year contract calls for Convair to develop a full-scale boron/aluminum composite section for the Advanced Terminal Interceptor, part of the Army's research into an antiballistic missile system.

According to M. D. Weisinger, Convair's Program Manager, the development contract calls for production of a section of the missile that houses the guidance equipment. Composite materials will allow the three-foot-long section to be stiffer but much lighter than if made with aluminum.

Forty layers of boron filaments, bonded to an aluminum matrix under extreme pressure and heat, will make up the section.



An Artist's Concept of the Centaur/Shuttle Combination

Centaur Upper Stage Favored For Space Shuttle Missions

Convair's Centaur upper stage has been selected by NASA for several planetary missions originating from the Space Shuttle beginning in 1985.

In a major policy statement on January 15th, Dr. Robert Frosch, NASA Administrator, said that the space agency "will enter into a contract this spring with General Dynamics" to integrate the Centaur vehicle in the Shuttle for the planned 1985 Galileo and International Solar Polar Mission launches.

The Shuttle will carry the Centaur and the planetary mission payloads into Earth

orbit, then the Centaur will be used to launch the interplanetary spacecraft on their long journeys into outer space.

"For the past several months we have been working very hard and very close with the NASA technical people to convince them that Centaur can be integrated with the Shuttle," said Chuck Wilson, Convair's Program Director-Shuttle/Centaur. "We believe the Shuttle/Centaur combination will fully meet the launch requirements for these major planetary and other high-energy missions."

Wilson said that NASA's decision, pending approval of the new administration and Congress, paves the way for other planetary, as well as military missions, for Centaur from the Shuttle.

The Galileo orbiter and probe launches to Jupiter were originally programmed to be flown aboard a three-stage Inertial Upper Stage (IUS) in 1984, but because of development problems there was a very low probability that that stage could be ready in time for the mission, NASA said. According to NASA, its 1982 budget provides funding for the Galileo mission in 1985 rather than 1984 and even if the IUS could be developed in time, it could not accomplish the mission because of the higher energy requirements which will be caused by the greater distance between the Earth and Jupiter in that year.

Frosch said that the 1981 and 1982 budgets would provide funds for modification of Centaur, integrating it with the Shuttle and making the relatively minor changes to launch facilities that would provide the very powerful combination available for first launches in 1985. Referring to Centaur, he said, "No other alternative upper stage is available on a reasonable schedule or with comparable costs."

Convair engineers are working on a wide-body version of Centaur for the planetary missions (GD World, December 1980). The Centaur vehicle for the Shuttle would be 28 feet long, a little over 14 feet in diameter and have a payload capability of putting 14,000 pounds into geosynchronous orbit. The high-performance stage would use the same Pratt & Whitney RL-10 engines that power the current Centaur.

As the program evolves, Convair would design and build four wide-body Centaur vehicles, including one test article. The first operational Shuttle/Centaur would be delivered in 1984 to support the 1985 launch of the Galileo spacecraft.

Centaur has played a significant part in unlocking the scientific mysteries of the Moon and the planets. In nearly all planetary missions undertaken to date, the spacecraft have been sent on their way by Centaur. Centaur's use in the Shuttle would be an evolutionary step in continuing General Dynamics' and Centaur's contribution to planetary exploration.

Tridents Named For Florida and Rhode Island

The U.S. Navy has named two more Trident ballistic missile submarines under construction at Electric Boat.

SSBN 728 will be named *Florida* and SSBN 730 will be called *Rhode Island*. Naming a Trident after the nation's smallest state had been expected since late last year, when President Carter agreed to the name. Hull sections for Tridents are fabricated at EB's Quonset Point, R.I., facility.

Both Florida and Rhode Island have long and proud naval traditions. The Sunshine State boasts a number of naval ship and air stations, including those located at Jacksonville, Pensacola, Mayport and Orlando.

In Rhode Island, the Narragansett Bay region was a privateer haven during the Revolutionary War and became the location of several important naval ship and air installations during World War II. Today, Newport remains the site of the prestigious Naval War College.

Former U.S. Navy ships named *Florida* were a sloop-of-war, a side-wheeler steamer and a steam frigate, all of which saw service in the 19th century. An early 20th century monitor and a World War I battleship (BB 30) also bore the name. Confederate State ships which were named *Florida* included a coastal defense pilot schooner, a blockade running steamer and a raider.

The *Rhode Island's* predecessors included a Civil War side-wheeler steamer and a battleship (BB 17) which served from 1906-1923.

Other Trident subs have been named *Ohio* (SSBN 726), *Michigan* (SSBN 727) and *Georgia* (SSBN 729). *Ohio*, the first ship in the class, is scheduled to start sea trials early this year.

Electric Boat, the only yard in the country building the 560-foot, 18,750-ton Tridents, has seven under construction and last month received a \$401 million contract for the eighth ship.

Savings And Stock Investment Values

Salaried	Dec. 1978	Dec. 1979	Dec. 1980
Government Bonds	\$ 2.0728	\$ 2.2795	\$ 2.4964
Diversified Portfolio	1.2923	1.6217	2.1720
Fixed Income	—	1.0474	1.1547
Hourly			
Government Bonds	2.0719	2.2796	2.4943
Diversified Portfolio	1.3215	1.6596	2.2163
GD Stock	\$15.9000*	\$30.2500*	\$42.7500*

* Reflects 2½ for 1 stock split of February 1979 and a 2 for 1 stock split of November 1980.

Suggestions Yield \$4,500 For 4 Convair Employees

Four Convair employees scored heavily in year-end suggestion awards; one receiving \$2,204, while three others shared \$2,320 for independently suggesting the same cost-saving idea.

V. D. Jennewein, a Material Cost Analyst at Lindbergh Field, was awarded \$2,204 for suggesting that a trash removal contractor would be willing to pay the company for recyclable materials being discarded. Previously, these materials were being taken to the salvage yard for disposal, and, while some cardboard was being separated by company employees, no major effort was being made to recoup all of the recyclables.

In the past, Convair was paying more than \$40,000 a year for trash disposal, but now the disposal contractor separates all of the recyclables and charges only for removal of the materials that cannot be recycled, a savings of more than \$22,000 a year.

C. F. Lewallen, a recently retired Manufacturing Dispatcher "A"; S. C. McFarland, Radiographic Inspector, and G. A. Gibbons, a Quality Assurance

Specialist, shared an award of \$2,320 for independently suggesting a change in reporting procedures on some low cost electronic parts which failed to meet designated inspection criteria.

Under previous Quality Assurance procedures, all parts which did not meet these standards were the subject of a Quality Assurance Report (QAR), a rather expensive 18-step processing procedure. In many cases, the processing cost far exceeded the cost of the failed items.

As a result of their suggestions, the Quality Assurance Manual was revised to allow defective low cost electronic parts, such as transistors and integrated circuits with standard or military part numbers, to be processed under less costly procedures.

First year savings from this suggestion are estimated at \$23,200.

Seminar Guides Setting Up More Quality Circles

Forty-one representatives from a number of GD divisions and facilities met at Pomona last month to discuss starting or expanding Quality Circles at their locations.

Quality Circles, which were first set up at Pomona last year, are small groups of employees working in the same area who apply problem-solving techniques to improve quality and productivity. The idea for Quality Circles came to this country from Japan. Each Circle has a first line supervisor who acts as the Leader, and a Facilitator who is responsible for training the Circle's members and assisting the Leader.

"We have found Circles work because they increase the opportunity for employees to communicate their ideas directly to management," says Mike Olivieri, the manager of two departments at Pomona that have set up three Circles.

Dr. Bonnie Hunt, Quality Circles Coordinator at Pomona who headed the training session, says Circles have been successful because they enable employees to participate in decisions that affect their jobs and help employees look for solutions to problems.

The meeting at Pomona included representatives from Convair, Electronics, Fort Worth, Stromberg-Carlson and American Telecommunications Corp.

Since Pomona set up GD's first Circle last year, it has formed five more and plans to add an additional 18 by the middle of this year.

Pomona's Camden facility presently has nine Circles and plans to double that number this year.

Convair and Electronics each have started three Circles.

Fort Worth is preparing to set up three Circles.

Stromberg-Carlson is planning to establish Circles at several of its locations.

American Telecommunications now has one Circle and plans to add more in the near future.

Marblehead Names Two Vice Presidents

Marblehead Lime Co. has announced the promotion of William Haubold to Vice President, Treasurer, and Glen O. Hein to Vice President, Sales.

Haubold has held various positions in the financial area of the company during his 13 years with Marblehead.

Hein has been with Marblehead seven years and has held a number of sales management positions in Chicago and Detroit. Most recently, he was National Sales Manager.



Part Former. Claude Reynolds and Gus Stembridge (at bottom, left to right) and Terry Greenroy and Ray Wall (at top, left to right) work at the table of a high pressure bladder press that has cut the production time of F-16 parts.

F-16 Production Time Reduced By New Fluid Cell Press

Fort Worth is obtaining substantial savings from a new high pressure bladder press that sharply reduces the time required to form F-16 parts from sheet aluminum and stainless steel.

Some of the parts, most of which go into the aircraft's fuselage, once took about 30 minutes to be formed on a previous press and finished by hand. Now the same parts can be completed in less than two minutes on the new bladder press, while hand finishing has been sharply reduced.

The bladder (or fluid cell) press operates without a ram or piston and squeezes sheet metal into precise shapes between a hydraulic pressure diaphragm and a form block.

In operation, the press pumps about 2,500 gallons of hydraulic fluid into a polyurethane bladder to press sheets of aluminum and steel around the master forms.

"We have found that the use of the new bladder press lowers our hand finishing by 75 percent," says Otto Wentworth, Fort Worth Project Industrial Engineer in the Facilities Planning Department. "The cost of producing the same number of parts has dropped from \$649,000 to \$183,000, since the new press was put into service."

Concerted Efforts Reduce F-16 Production Costs

Production costs on the F-16 fighter were cut by more than \$205 million during 1980 as a result of concerted efforts by management and employees at Fort Worth.

At the beginning of 1980, Richard E. Adams, GD Vice President and General Manager of Fort Worth, set a cost reduction goal of \$91.4 million for the year.

"However," according to C. W. "Smokey" Doyle, Fort Worth's Director of Cost Reduction and Value Control Department, "we had an actual reduction of \$205.7 million."

The largest reduction was in procurement costs, where a reduction of \$26.6 million was targeted but the result was \$100.2 million.

The results in five other major areas that had been targeted were:

- Value Control, \$35.9 million, or \$20 million better than the goal.
- Productivity improvement, \$38.6 million, or \$9 million over the goal.
- Resources, Economics and Conservation, \$4.9 million or \$1 million better than the goal.
- Employee Suggestions, \$4.4 million compared with a goal of \$3 million.
- Management improvement, \$21.7 million or \$8 million better than goal.

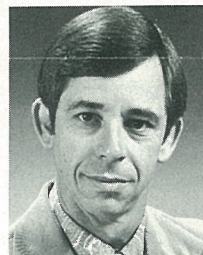
Four-person crews on a two-shift operation can normally produce about 45 F-16 shipsets of parts per month on the new bladder press. Each of the sets has about 450 parts, some of which are 5 to 6 inches long, while others measure 12 feet by 3 feet.

Elder to Direct Pomona's Sparrow Manufacturing

Max H. Elder has been appointed Director of Sparrow Manufacturing at Pomona.

In his new position, Elder will be responsible for all manufacturing activities associated with Pomona's production of the radar-guided, air-to-air missile, which is used on U.S. Navy and Air Force aircraft.

Elder joined Pomona in 1959 as an Associate Engineer assigned to the Missile Systems Test Laboratory. He subsequently was promoted to Test Engineer in the Guidance Design Section working on evaluation and integration of new guidance systems for tactical weapons. He later was named a Design Specialist and prior to his new appointment was Manager of Production Support, Sparrow programs.



Elder

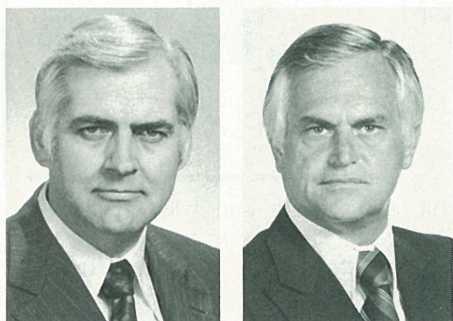
Fort Worth Forms New Department For Small Business

Fort Worth has formed a Small Business Programs Department to handle the division's small and minority business subcontracting.

"Elevating small business purchasing programs to departmental status reflects the growing importance placed by the U.S. government on this activity and on the outstanding success which the efforts of the entire division have achieved," said Norman E. Day, Fort Worth's Director of Material.

In making the announcement, Day also said that Budge V. Lee, a 38-year GD veteran, had been named Small Business Officer and head of the new department.

Fort Worth's small business subcontracting program has been given the U.S. Air Force's highest possible rating since 1965; the minority subcontracting business program has earned the highest possible rating since 1976, just two years after the program began.



Blackshaw

DaPra

George E. Blackshaw has been named Convair Vice President-Marketing, and Dan E. DaPra has been named Convair Vice President-Research and Engineering.

Blackshaw, formerly Vice President-Research and Engineering at Convair, joined the company in 1978 from the Department of Defense where he had served for two years as Director for Tactical Missile Systems. From 1972 until 1976, he was Technical Director for the U.S. Air Force's Armament Division at Eglin AFB, Fla. Prior to that, he served in various engineering assignments at the Marquardt Corp. and Hughes Aircraft Co.

Blackshaw, a native of Bakersfield, Calif., was graduated from California State Polytechnic College at San Luis Obispo in 1958 with a Bachelor of Science degree in Aeronautical Engineering.

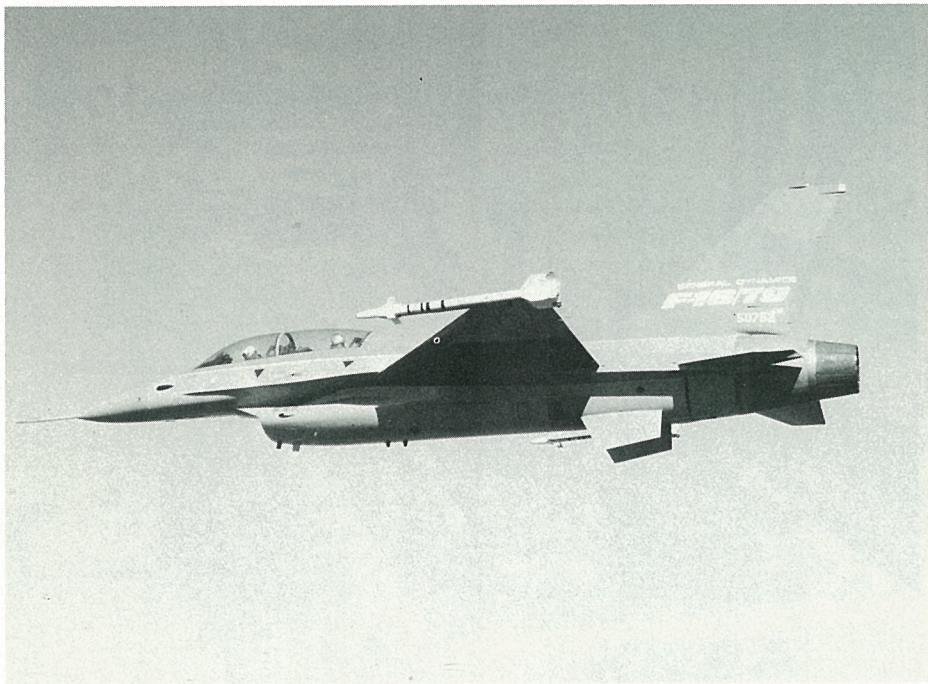
DaPra joined General Dynamics in 1957 at Pomona. Over the next several years, he held engineering positions of progressively greater responsibility in flight analysis, design and advanced programs. He left the company in 1970 to join Ingalls Shipbuilding, Pascagoula, Miss., as Director of Systems Engineering.

He rejoined General Dynamics in 1978, after four years with Rohr Marine, Chula Vista, Calif., where he was Director of Advanced Programs. He was appointed Director of Test and Evaluation at Convair in 1979 and was Director of Systems Engineering before being named to his new post.

DaPra completed his undergraduate work in 1958 in electronics engineering at the University of Southern California and holds a master's degree in systems engineering from California State University, Fullerton.

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The F-16/79 Intermediate Export Fighter

F-16/79 Ready for Evaluations By Potential Foreign Customers

Fort Worth's F-16/79 intermediate export fighter is being readied for evaluation flights by pilots from several potential customer air forces. Last month, the aircraft completed its flight-test qualification and certification program.

U.S. Air Force pilots flew simulated combat missions in the prototype fighter at Edwards AFB, Calif., in early January, following the intensive two-month-long company test program.

The F-16/79 prototype was flown for 71.4 hours during 72 missions in the test program to demonstrate its performance capability with the 18,000-pound-thrust General Electric J79-GE-119 turbojet engine.

"The J79 engine operated flawlessly throughout the very demanding test program, and, as expected, the handling qualities of the aircraft are nearly identical to the standard F-16," said Sterling V. Starr, Fort Worth Vice President and F-16/79 Program Director.

During the flights, the fighter reached an altitude of 50,000 feet, demonstrated maximum airspeed in excess of Mach 2 and routinely carried out 9 "g" maneuvers during simulated combat operations.

During the Air Force flights, Lt. Col. Joseph Dryden and Captain Greg Lewis demonstrated the F-16/79's air combat maneuvering capability in mock combat with other high performance aircraft. On

other flights, they dropped a number of MK 82 500-pound bombs on target at various speeds and were able to demonstrate that the fighter has sufficient excess energy to execute effective evasive maneuvers to avoid enemy antiaircraft fire.

The F-16/79 was developed under a company-funded program to fulfill the U.S. government's requirements for an export fighter with cost and performance characteristics that lie between the current U. S. export fighter, the F-5E, and the standard F-16 Fighting Falcon, currently in operational service with the U.S. Air Force and five allied air forces in Europe and the Middle East. The Fighting Falcon is powered by a single Pratt & Whitney F100 turbofan engine which is in the 25,000-pound-thrust class.

The F-16/79 offers substantially greater speed, range, avionics and maneuver capability than the F-5E. Production versions of General Dynamics' new intermediate fighter will retain the main components of the F-16's advanced digital avionics equipment, including the Westinghouse all-weather fire control radar.

About 25 countries are expected to have a requirement for new intermediate fighters during the next 15 years. The F-16/79 currently is a finalist in new fighter aircraft competitions in Austria and Taiwan.

Aerospace Paces Sales, Earnings

Continued from Page 1

weapon system will extend well into the future," Lewis said.

In the marine group, sales and earnings at Electric Boat were higher than last year, primarily reflecting increased work on the very large Trident ballistic missile submarine program.

Lewis said that major problems that have caused delays in submarine deliveries have largely been solved.

"Electric Boat now plans to deliver six SSN 688-class attack submarines and the first of the giant Trident ballistic missile submarines this year," he said. "Work is accelerating on the other six Tridents under construction and last month's contract award for the eighth confirms the government's continued strong support for this new strategic weapon system."

Quincy Outlook Improves

Sales and earnings at Quincy Shipbuilding were down from 1979, but the business outlook for the shipyard improved late in the year with several orders for new commercial work.

Quincy also has received provisional contracts and a letter of intent for a total of nine new LNG tankers to transport gas from Indonesia and Alaska to the U.S. West Coast. Lewis said work on these ships would probably not get started before 1983 because construction of the California LNG receiving terminal con-

tinues to be delayed by government regulatory procedures.

The domestic resources group showed improved results last year with Material Service having all-time record earnings in spite of a general slowdown in construction activities in the Chicago area. However, earnings at Asbestos Corporation, the company's Canadian subsidiary, were down substantially as a result of a three-month strike last spring and the generally weak market conditions in the latter part of the year.

In the business systems and telecommunications areas, Datagraphix continued to be the leader in computer output microfilm with the highest earnings in its history, while Stromberg-Carlson and American Telecommunications continued to be affected adversely by the general economic slowdown in this country. Stromberg-Carlson was particularly affected by record high interest rates which prevented many telephone companies from ordering badly needed new switching systems.

"We believe that the prospects for significantly increased activity in the telecommunications field remain strong," Lewis said. "Stromberg-Carlson has continued its very aggressive company-funded research and development program to insure having a broad line of advanced digital switching systems available for the long-term market."

NATO's First F-16 Squadron Activated at Belgian Air Base

The 349 Squadron of the Belgian Air Force recently became the first F-16 fighter squadron assigned to serve with North Atlantic Treaty Organization (NATO) forces in Europe.

This milestone was observed during ceremonies attended by NATO Secretary General Dr. Joseph Luns and other NATO officials at Belgium's Beauvechain Air Base, the first F-16 base to be activated in Europe.

As part of the ceremonies, two Belgian F-16s were scrambled to demonstrate the 349 Squadron's primary NATO role, the quick reaction mission to intercept enemy aircraft. A third Belgian F-16 was flown to demonstrate the versatile fighter's aerial combat maneuverability.

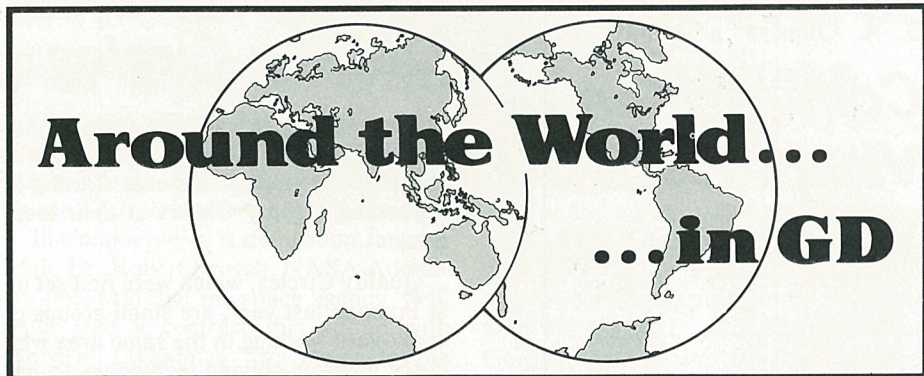
"I will not hide our feelings that we are very proud that (NATO's first F-16 squadron) is a Belgian squadron," Belgian Air Force Chief of Staff Gen. Marcel De Smet told Secretary General Luns, NATO ambassadors and representatives from 13 nations. The dignitaries included

Belgian Chief of Cabinet General J. Lefebvre; U.S. Air Force Gen. Charles Gabriel, Commander Allied Air Forces in Central Europe and other important European defense officials.

In accepting command of 349 Squadron's 18 aircraft and pilots, Gen. Gabriel praised the Belgian Air Force's dedication in qualifying the squadron for NATO service less than two years after receiving its first F-16 and with limited funds available for operational training.

"I am totally confident that this aircraft will continue to delight us all, from the young pilots who have the good fortune to fly it, to the senior commanders who have an exceptionally flexible addition to their options," Gabriel said. "It is my belief that the potential of this multirole aircraft will stretch us in every way for many years to come."

The Belgian Air Force plans to assign a second F-16 squadron to NATO forces this year from its 1st All Weather Fighter Wing.



CHQ: K. Barry Marvel transferred from Fort Worth and was promoted to Corporate Director-Contracts... Antonio C. Cadiz joined as Senior Subcontract Auditor... Richard S. Goldman transferred from Convair and was named Corporate Manager, Facilities Planning-Aerospace... Ad R. Mosco was promoted to Corporate Director-Pricing... Billy R. Kellum to Corporate Director-Marine Systems... Donald W. Thompson to Corporate Manager-U.S. Military Aircraft Programs... Jim D. Martin joined as Corporate Manager-Procurement.

Fort Worth: P. W. Alston was promoted to Manufacturing Support Equipment Engineer... M. D. Davis to Planning Analyst... A. B. Ellingson Jr. to Program Analyst Senior... M. E. Frazier to Manager of Quality Assurance... B. L. Fry to Engineering Administrative Group Supervisor... W. W. Hall to Manager of Finance... C. P. Harrison to Engineering Manager... L. A. Hosler to Program Specialist... R. M. Hoyt to Logistics Engineer... K. M. Kuykendall to Program Estimator, Senior... T. J. Lunday to Material Cost Supervisor... J. W. Puckett to Chief of Procurement... M. R. Scales to Professional Development Supervisor... P. J. Slover to Assistant Project Engineer... G. K. Smith to Engineering Program Manager... R. D. Snider to Logistics Engineer, Senior... H. W. Wilson to Project Manager... M. T. Winchester to Photographic Supervisor... D. L. Wright to Technical Group Supervisor.

ATC: Harvey Derril was promoted to Manager, Molding.

Electric Boat: Kathleen Mejza was promoted to Supervisor, Quality Assurance... Kevin H. Murphy to Chief, Nuclear Test Engineering... Edward A. Haddad to Supervisor, Quality Control Engineering... Rocco J. Celtruda to Deputy Program Manager... Elwin E. St. Pierre and John F. Seidel to Foreman... Noel M. Brehant, Hubert G. Rice, Robert A. Sasko, John J. McCann and Jonathan VanDeVuisse to Engineering Supervisor... Edmund T. Cleary to Ship Manager... Matthew Aleskiewicz to General Foreman... Jean E. Browning to Chief Reproduction Services... Paul E. Dojka and Theodore Banasiewicz to Nuclear Test Supervisor... Frank T. Smith to Training Administrator... Richard Bradley to Assistant Chief, Nuclear Test Engineering... Joseph Hague to Assistant Superintendent... Richard J. Jablonski and Henry J. Milunus to Supervisor of Quality Assurance.

Electronics: D. Y. Hayashigawa was promoted to Factory Engineer, Senior... V. G. Vassiliou to Senior Field Engineer... W. H. Zettinger to Program Manager.

Stromberg-Carlson: Donald F. Coons was promoted to Supervisor, Integrated Test Facility... Garry R. Morris to Supervisor, Technical Training... David E. Maine to Supervisor Engineering Group 2... Larry K. Weiser 2d to Supervisor, Field Service... John A. McElver to Supervisor, Engineering Group 1... Donald L. Lewis to Equipment Applications Engineer 1.

Datagraphix: James E. Burke was promoted to Quality Assurance Engineer... Denis G. Taipale to Supervisor, Quality Assurance Engineering.

Convair: Pamela A. Burke was promoted to Business Planner... Terry L. Leek to Operations Supervisor-Industrial Engineering... Philip J. Poehlman to Manager-Material Operations... Carole J. Black to Financial Supervisor... Bruno W. Bracka to Engineering Director... Louis P. Eidenmiller and Rickey U. Sunamoto to Program Administrator... Richard F. Schweitzer to Group Supervisor... Norville I. Yandell to Logistical Specialist.

Pomona: Creighton N. Arendt, Jerry E. Babbs and Frank Carpenter Jr. were promoted to Quality Assurance Specialist, Senior... Richard L. Bullard to Project Representative... Frank Czerniewski and Lowell D. Edwards to Superintendent... Gerard J. Guillaume and Deborah A. Luckert to Material Liaison Representative... Edward A. Howell, Robert J. Connor and William J. King to Project Coordinator... Dale M. Joiner to Section Head... Paul D. Jordan, Robert A. Spalding and Paul G. Rice to Project Engineer... Debra L. Mahlow to Quality Assurance Specialist... John P. McCroskey to Industrial Relations Representative, Senior... Raymond W. Naylor to Group Engineer... Vincent A. Pree to Manufacturing Group Engineer... Bertrum Sheets and John R. Patino to Packaging Group Engineer... Robert Esslinger to Staff Assistant... Vincent A. Ferradino, Richard L. Kukulka, Douglas J. McCroskey, Dale E. Rainsberry and Spencer J. Speer to Quality Assurance Project Administrator.

Quincy Receives \$61 Million Contract For Container Ship

Quincy Shipbuilding has received a \$61 million contract from Sun Shipbuilding Company of Pennsylvania for the construction of a roll-on, roll-off container ship for Waterman Steamship Corporation, New York, N.Y.

The ship will be 692 feet long with a beam of 105 feet, 6 inches and will have a full-load displacement of 38,500 tons.

Construction of the vessel will begin next month, with completion scheduled for November 1982. Approximately 800 employees will be involved in building the ship.

Last month, Quincy received a \$60 million contract for the construction of a 655-foot-long coal carrying ship to transport 2.2 million tons of coal annually from East Coast ports to New England Electric Systems power generating facilities. The contract formalizes an agreement announced last October, when plans for that project were first made public.

Bremerton (SSN698) Accepted by Navy Following Sea Trials

Electric Boat's sixth 688-class fast-attack submarine, *Bremerton* (SSN698), was accepted by the Navy last month.

Notice of the acceptance came from Capt. J. F. Yurso, Navy Supervisor of Shipbuilding at Groton.

Bremerton, expected to be commissioned late this month, is named for a city in Washington with close Navy ties. The Navy maintains a mothballed fleet there and nearby Bangor will be the West Coast base for Trident submarines.

The 360-foot, 6,900-ton vessel received high marks on her sea trials, conducted in December. "*Bremerton* is one of the best boats ever built at Electric Boat," said L. E. Holt, EB's Assistant General Manager - Operations, who headed a team of 37 shipyard employees on board for the trials.

Bremerton joins five other EB-built subs of her class that have already been delivered and are operational. They are *Philadelphia* (SSN690), *Omaha* (SSN-692), *Groton* (SSN694), *New York City* (SSN696) and *Indianapolis* (SSN697).

The division has contracts for 14 more of the fast-attack vessels and eight of the larger Trident missile subs.

4th COMSTAR Is Launched by Atlas-Centaur

A Convair-built Atlas-Centaur launch vehicle last month placed the fourth in a series of COMSTAR domestic communications satellites into perfect orbit following launch February 21st from Cape Canaveral, Fla.

After the launch vehicle rocketed away from the pad at 6:23 p.m., the early evening shot was called "spectacular" by Dan Sarokon, Convair's Eastern Test Range Manager. "It was an impressive sight for people along the coast who were watching and able to see the separation of the Atlas booster engines as they dropped off down range into the Atlantic," he said.

The Atlas-Centaur launch vehicle initially placed the COMSTAR into a highly elliptical "transfer orbit." About 48 hours after launch, a command was sent to fire the satellite's motor, circularizing the orbit of the spacecraft at geosynchronous altitude over the Equator. Now on station, COMSTAR is undergoing in-orbit check-out and performance testing prior to being placed in service in May.

Towering 134 feet, the powerful Atlas-Centaur was erected on the pad at Launch Complex 36 last November. On February 10th the COMSTAR was encapsulated in the payload shroud for protection during flight through the atmosphere.

GD World

Vol. 11 No. 3

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Stinger Being Fired During U.S. Army Tests

Pomona's Stinger Is Supplied To U.S. Army Units in Europe

The U.S. Army has begun supplying its troops with the new Stinger air defense guided missile system developed and produced by Pomona.

The first units receiving the portable, shoulder-fired weapons will be maneuver elements of the Army in Europe. The U.S. Marine Corps will also use the weapon.

Stinger protects ground forces against attack by low-flying, high-speed jet aircraft and helicopters. Stinger offers distinct improvements in defense capability over the Redeye missile system it replaces. It can engage faster targets at greater range including those flying directly towards the gunner. Stinger has built-in electronics compatible with all NATO aircraft that aid the gunner with aircraft identification.

The Stinger system evolved from the Army's Redeye, the world's first man-portable shoulder-fired, infrared homing anti-aircraft missile, also produced by General Dynamics and first deployed in 1967. Pomona has delivered over 33,000 Redeye systems to the Army and Marine Corps and allied nations.

Stinger's improvements involve a better propulsion system and greater resistance to enemy countermeasures. Stinger has the ability to engage targets in any aspect, whether head-on, crossing or flying away from the gunner.

Stinger is a fire-and-forget weapon. The missile is packaged in a throwaway launch tube and delivered as a certified round requiring no field testing or maintenance. A separate, reusable gripstock is attached to each missile round before firing. Once the gunner fires Stinger, he discards the launch tube and in cases of

Nine GD Locations Win Safety Award

Nine divisions, subsidiaries and facilities of General Dynamics have earned the Chairman's Award for Excellence in Safety Performance for the Year 1980.

The annual award is made to those units of General Dynamics which have compiled a safety record that is substantially better than its industry and which have conducted an active and comprehensive loss control program that meets or exceeds corporate standards.

Last year's winners were: Asbestos Corporation Ltd., Convair, DatagraphiX, Electronics, Fort Worth, Marblehead Lime, Material Service, Pomona and the Rochester Facility of Stromberg-Carlson Corp.

multiple attack, readies the next Stinger for firing.

Engineers at Pomona are now developing the next generation man-portable air defense system improvement, a modular seeker called Passive Optical Seeker Technique (POST).

The POST seeker will provide Stinger with additional countermeasures immunity, increased detection ranges and ability to pick targets out of background clutter.

The first flight test of the POST engineering development seeker resulted in a direct hit on a subscale drone. This was the first flight test of an electro-optical guidance system employing microprocessors for controlling the signal processing logic.

Tomahawk Demonstrates Accuracy During 300-Mile Overland Flight

A U.S. Navy/Convair Tomahawk cruise missile successfully demonstrated precision terminal accuracy in a land-attack mission against a simulated ground target at the Tonopah Range, Nellis AFB, Nev. on February 15th.

This high accuracy was achieved using a Navy-developed Digital Scene Matching Area Correlation (DSMAC) terminal update guidance system. DSMAC supplements the Terrain Contour Matching (TERCOM) system which guides the Tomahawk missile to a designated geographical location.

TERCOM compares measured terrain heights stored in its on-board computer with data received from its radar altimeter and adjusts the missile's course and altitude. The DSMAC digitizes photo-optical data and compares it to stored data to refine the final TERCOM update and zero the missile in on its target.

In the test, the Convair-built Tomahawk missile was carried aloft from the Pacific Missile Test Center at Point Mugu, Calif., under the wing of a Navy A-6 attack aircraft. The missile was launched over the Pacific Ocean off the California coast, made landfall north of Santa Barbara and flew approximately 300 miles over land to Nevada.

After the cross-country flight, the missile made several simulated attacks on its target. It was recovered at the end of the test using a parachute recovery system and will be refurbished and reused in additional tests of the missile.

This was the 60th test flight of a Tomahawk from various ground, air, surface and undersea platforms.

Stromberg DMO Brings Korea Into Digital Age

Stromberg-Carlson recently delivered a Digital Mobile Office (DMO) to the Republic of Korea. The DMO is a fully featured, digital central office and will be the first digital telephone switching system installed in Korea. The equipment was provided as part of a contract agreement Stromberg-Carlson had with the Korean Office of Supply and the Ministry of Communications.

The agreement provides for the installation of the DMO and three clusters of Digital Satellite Units (DSUs) which will provide an improved telephone service network to the community of Won Dang and surrounding industrial parks near Seoul, Korea.

Before installation at Won Dang, the system was displayed at the American Embassy's U. S. Trade Center in Seoul. The Trade Center, established in 1974, promotes American products, equipment, technical experience and services in Korea.

Stromberg-Carlson was selected by the Korean Ministry of Communications because it is a proven supplier of digital switching systems, with over 190 systems currently in service worldwide. The DMO was chosen in order to evaluate current digital switching technology for use in Korea.

Because it is fully tested and installed prior to shipment, the DMO does not require any special construction and can be placed into service almost immediately after arrival on site. The system is compatible with the existing telephone network and future network application requirements. All lighting, environmental controls and power are contained within the trailer, which can be expanded as service requirements demand.

The installation, scheduled for completion in May, will initially consist of one DMO and 10 DSUs. The DMO (1,600 lines) will act as the central exchange and will be located at Won Dang. It will connect to 10 satellite units (with a combined total of 2,400 lines) located in nearby towns.

Convair is the prime contractor for the Tomahawk-Sea Launched Cruise Missile (SLCM) for the U.S. Navy and the Tomahawk Ground-Launched Cruise Missile (GLCM) for the U.S. Air Force.

See Photos Page 3

Convair is also developing the Medium Range Air-to-Surface Missile (MRASM) for the Air Force which will be used in attacking heavily defended ground targets.

All three programs are under the direction of the Department of Defense's Joint Cruise Missiles Project.

F-111s Deploy to Korea For Joint Exercise

Sixteen F-111D aircraft assigned to the 27th Tactical Fighter Wing at Cannon AFB, N. Mex., left the United States this month for a two-week deployment in the Republic of Korea.

The Fort Worth-built, swing-wing fighter-bombers took part in "Team Spirit '81," a joint military exercise involving units of the United States and the Republic of Korea.

This marks the second time that a group of F-111Ds from Cannon have been sent briefly to Korea. The first was in late 1979.

About 300 maintenance and support personnel and 160 tons of equipment were also sent to Korea's Sachon Air Force Base for the exercise, March 4th through March 20th.

F. Jenny to Head Electronics; Chesus Named Aerospace VP

Frederick F. Jenny has been appointed Vice President and General Manager of Electronics Division. He formerly served as President of Stromberg-Carlson.

Jenny succeeds Frank O. Chesus who has been appointed Vice President of Operations - Aerospace. Both executives will report to James M. Beggs, GD Executive Vice President - Aerospace.

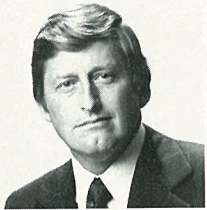
In making the announced changes, Beggs said, "Frank Chesus has made a major contribution to the Electronics Division and his managerial and manufacturing skills will be of great value to the corporation's aerospace divisions."

Chesus had been Vice President and General Manager of Electronics since June 1978. He joined GD at Pomona in 1956 as a Senior Design Engineer. He has held increasingly important engineering and management positions at Pomona, including Standard Missile Program Director, Director of Advanced Programs, Sparrow Missile Program Director and Vice President - Operations.

Jenny joined Stromberg-Carlson as President in May 1978 and has led the company's efforts in the design and development of advanced telephone and telecommunications equipment based on digital computer technology.

Prior to joining Stromberg-Carlson, Jenny was Vice President of Aerospace Operations for Control Data Corporation with responsibility for development of specialized processing systems for shipboard, ground-based, airborne and spaceborne weapons systems. He joined Control Data in 1974 as General Manager of its Aerospace and Advanced Systems Operations.

From 1956 to 1973, he was employed by IBM Federal Systems Division, where he was responsible for design and development of aerospace computer systems.



Jenny

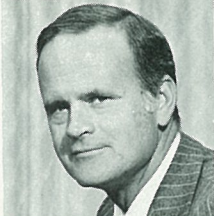


Chesus

A native of Milwaukee, Jenny received a Bachelor of Science degree in Electrical Engineering from Valparaiso University in 1956 and earned a master's degree in electrical engineering at Syracuse University in 1960.

Porter Appointed ATC President

William B. Porter has been appointed President of American Telecommunications Corporation (ATC). Porter, 49, previously served as Vice President-Marketing for Datagraphix, Inc.



Porter

Porter has been with Datagraphix since 1968 when he joined the company as a sales representative. He has held a number of increasingly responsible positions in the sales and marketing areas, including Managing Director of European Operations. He was appointed Vice President-Marketing in 1979.

A native of Houston, Tex., Porter holds a Bachelor of Science degree in Physics from Sam Houston State College, Huntsville, Tex.

ATC is a manufacturer of telecommunications equipment including automatic dialers, answering machines, and decorator and character telephones which are supplied to the Bell System and independent telephone companies. The company, headquartered in El Monte, Calif., employs about 1,100 people.

Accountant's Idea Lowers Convair Interest Expense

A combination of high interest rates and a desire to simplify some of the paperwork required on government contracts led Ardith L. Burger, a Convair Management Accountant, to submit an Employee Suggestion that earned her nearly \$5,200.

The rising interest rates that businesses have had to pay recently to borrow money even for a few days concerned her, because the banks are a source for funds for Convair between the time a cost voucher is submitted to the government and the time it is paid.

Burger realized that NASA and Department of Defense cost reimbursement vouchers were being prepared in detailed format by hand and then retyped for submission to the government. She recommended that the form be revised to eliminate some of the detail and be submitted in handwritten form, with a copy of the company's Cost Ledger printout to provide additional information.

Her idea saved two days' time in submission of the vouchers and saved approximately half an hour in preparation time - while reducing the potential for errors from transcribing the data.

A savings of two days per voucher, when applied to the more than 30 vouchers that are submitted by Convair each month, totals a significant savings to the division in interest charges alone.



Marblehead Lime's New Kiln at South Chicago

World's Largest Lime Kiln Operating at Marblehead

By G. Alexander Smith

Standing on a maintenance catwalk 40 feet above the ground with a bone-numbing Lake Michigan wind at his back, Creed Tallent warmed his face and hands by holding them a few feet from the slowly rotating steel cylinder above him.

"I've been around lime kilns for 29 years, but this one is the Cadillac of kilns," he said. "It works like any other kiln, but it's bigger, has computer controls and even its own television system."

Tallent was talking about Marblehead Lime's new kiln at the South Chicago Plant, the world's largest lime-producing kiln, which had been installed through the efforts of dozens of Marblehead employees at the plant and at the company's headquarters.

As Tallent led a small group of visitors along the catwalk beside the 485-foot-long kiln, there was a low rumble of limestone rocks being tumbled inside. He stopped where the sound was much louder. Than after a minute or two, he continued his short course on the history of lime.

Lime, he said, is one of the oldest materials produced by using a pyrochemical reaction - it was used by the ancient Egyptians to build the Pyramids, and it is mentioned in the Bible. Today, it is used in the production of steel, for the treatment of water and in the processing of such diverse products as sugar and paper.

On a tonnage basis, more lime is produced in the United States than any other bulk chemical except sulphuric acid.

Most of Marblehead's lime production is used by the steel industry where the material serves as a flux to remove impurities such as silica, phosphorus and sulphur from iron. In the basic oxygen furnace process of making steel, about 140 pounds of lime are required for each ton of iron ingot.

Marblehead is the nation's largest producer of lime, and at its South Chicago Plant, coal from southern Illinois is brought together with limestone from quarries in eastern Michigan in huge cooking tubes called kilns (pronounced KILNs or KILLs, depending on whom you ask).

The limestone, screened and graded into pieces about the size of tennis balls, is poured into the upper end of the kiln. The coal, pulverized to the consistency of women's face powder, is blown into the lower end and ignited. The kiln itself is a 14-foot diameter tube lined with refractory material mounted on concrete pylons at a slight angle. Inside the kiln are ridges and barriers, called dams, which tumble the limestone as it slowly works its way down the cylinder.

As the limestone slowly tumbles down the tube kiln, it is heated to 2,700 degrees Fahrenheit and carbon dioxide is driven off - leaving calcium oxide, or lime.

The new kiln can produce 1,500 tons a day, and it replaces two of the four older and smaller kilns at the plant. The kiln cost more than \$20 million, including \$5 million which was spent on pollution control equipment.

Tallent, Manager of the South Chicago Plant, explained that the new kiln uses remote television cameras to monitor choke points where the coal, limestone and lime could become clogged and halt production. A computer traces all moving machinery from raw material storage to the lime hoppers.

After the glowing red lime falls out of the lower end of the kiln, it is cooled to about 80 degrees and loaded into huge hoppers ready for delivery to the customer.

"One thing about this new kiln is its efficiency," Tallent said. "We use the outside air to cool the lime - and that hot air is then used to fire the kiln. Producing lime is an energy-intensive process, and we get the most use out of each pound of coal that we can."

At the upper end of the kiln, the exhaust gases from the combustion of the air and coal are removed and routed through a bag house to remove particulate pollutants before it is discharged.

Marblehead was founded in 1872 in Springfield, Mo., and built the first lime kiln at the South Chicago plant in 1925 to supply lime to the growing steel industry in nearby northern Indiana. In 1948, the firm was acquired by Material Service Corp. which joined General Dynamics in 1959. Today, Marblehead has 19 kilns in Illinois, Utah, Michigan, Indiana and Pennsylvania.

Reaching the upper end of the kiln along the catwalk, Tallent turned and saw a group of company officials near the spot where he had heard the limestone banging loudly inside the kiln.

"Hey Creed," one called, "is there a problem here?"

Tallent shouted back, "It's just some material piled up behind a dam - it'll clear in a minute."

Returning to the group, he said, "If there was a problem, if the refractory had come loose, you could feel the difference in heat; I checked it when I went by. There's no problem."

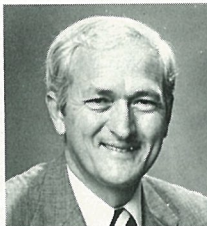
"This may be the largest kiln in the world, and it might have all sorts of computer controls and television, but you still need two ears and two hands to operate it."

J.M. Bridges Named Stromberg's Acting General Manager

James M. Bridges, Vice President - Finance at Stromberg-Carlson, has been appointed Acting General Manager.

Bridges joined Stromberg-Carlson in 1978 and is responsible for financial accounting and contractual operations of the GD subsidiary. Formerly, he was a Manufacturing Controller for the General Business Group of IBM Corp. which he joined in 1966.

A native of Huntsville, Ala., Bridges was graduated from Athens State College in Alabama in 1966 with a Bachelor of Science Degree in Business Administration.



Bridges

Savings And Stock Investment Values

Salaried	Jan. 1979	Jan. 1980	Jan. 1981
Government Bonds	\$ 2.0961	\$ 2.3043	\$ 2.5154
Diversified Portfolio	1.3380	1.7329	2.0544
Fixed Income	—	1.0559	1.1653
Hourly			
Government Bonds	2.0953	2.3036	2.5127
Diversified Portfolio	1.3686	1.7688	2.0992
GD Stock	\$16.8000*	\$40.1900*	\$34.3750

* Reflects 2½-for-1 stock split of February 1979 and 2-for-1 stock split of November 1980.

Venezuelan Air Force Team Evaluates F-16/79 Prototype

A Venezuelan Air Force (FAV) evaluation team recently flew the General Dynamics F-16/79 fighter prototype at Fort Worth.

Three Venezuelan pilots completed nine air combat and air-to-surface evaluation flights in early February, including several missions under instrument flying conditions and a night instrument cross-country navigation flight from England AFB, La., to Fort Worth.

The FAV pilots flew the two-seat F-16/79 prototype a total of 10 hours over a six-day period.

Gen. Carlos Pinaud, the FAV Evaluation Team Leader, and Col. Roberto Gruber, FAV Mirage Fighter Group Commander, each flew four F-16/79 missions. Col. Jose Angel, former Mirage Group Commander, also flew the aircraft.

General Dynamics' demonstration pilots for the FAV flights were Neil R. Anderson, Director of International Flight Evaluation, and F-16/79 Program Test Pilot James A. McKinney.

The six-member FAV team also was briefed on F-16/79 avionics systems, aircraft subsystems and logistics. Brig. Gen. Raimundo Aular, of the FAV Logistic Command, conducted a preliminary review of the proposed F-16/79 logistic system.

The F-16/79 prototype was fitted with production avionics and radar systems following the completion of a two-month flight test qualification and certification program.

The F-16/79 is powered by a single 18,000-pound-thrust General Electric J79-GE-119 turbojet engine. It was developed under a company-funded program to fulfill the U.S. Government's requirements for an export fighter with cost and performance characteristics that lie between the current U.S. export fighter, the F-5E, and the standard F-16 Fighting Falcon, currently in operational service with the U.S. Air Force and five allied air forces in Europe and the Middle East.

New Plater Reduces Stromberg's PCB Gold Usage by 40 Percent

A 40 percent reduction in gold consumption has been achieved with the installation of new equipment at Stromberg-Carlson's Printed Circuit Board (PCB) facility in Rochester, N.Y.

Faced with rising gold prices, the Rochester Facility last fall installed a Fast Finger Plater, a machine which removes solder, scrubs and activates the underlying bare copper fingers, or contacts on the PCBs. The machine then plates the copper with nickel and gold—all in one continuous operation. With two operators, the plater can process more

Steele Appointed VP at DatagraphiX

Richard A. Steele has been appointed Vice President - Marketing for DatagraphiX, Inc. Steele was formerly National Sales Manager for DatagraphiX and succeeds William B. Porter, who has been named President of American Telecommunications Corporation.

In his new position, Steele will be responsible for all domestic marketing and sales activities and will report to Edward T. Keating, President of DatagraphiX.

Steele joined DatagraphiX in 1972 as a marketing representative and was appointed National Sales Manager in January 1978. From 1967 to 1972, he was associated with IBM Corp. as a systems engineer and marketing representative.

A native of Newark, N.J., he holds a Bachelor of Science degree in Industrial Engineering from Millikin University, Decatur, Ill.

Coffman Named Abilene Facility GM

Jack D. Coffman, who for the last six years has been Director of Manufacturing at Fort Worth's heavy machining facility in Abilene, Tex., has been promoted to General Manager.

He succeeds Richard C. Hartwig, an Industrial Engineer with 24 years of General Dynamics service, who has returned to the Fort Worth plant to head a production improvement team.

Coffman has been with the facility 17 years. He has served as Manager of Quality Control at the Abilene facility which will produce \$15 million worth of precision machined parts and forgings for the aerospace industry this year.

GD World

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Tube Bender. JoAnn Sanders uses a fully-automatic tube bending machine to form an F-16 hydraulic line out of a piece of six-foot, three-eighths inch diameter tubing.

Tube Bending Machines Improve Speed, Quality at Fort Worth

New equipment installed at Fort Worth has brought tube bending into the computer age.

Six fully automatic, computer-controlled machines now make bends in aluminum and steel tubing which vary in diameter from three-sixteenths of an inch to three inches. Some of the tubing must be bent only once, while some are bent as many as 13 times—depending on the structures in the aircraft the tube must fit around.

"Each F-16 has 1,786 tubes in it, and more than two-thirds of those tubes have multiple bends," said Bill Grace, General Foreman of Fort Worth's Tube Fabrication Department. "With the new tube-bending machines, we are able to turn out those tubes rapidly and accurately. Our production time is greatly improved, and we have virtually no rejects."

The tubes are used in the hydraulic, fuel, oxygen and environmental control systems of the Fighting Falcon. One of the most complicated tubes in the F-16 is for the hydraulic system—it is three-eighths of an inch in diameter and has 11 bends, some almost like a horseshoe.

With the machines that were formerly used to bend the tubing, it took two employees five days to make 60 of the tubes; about six tubes each week were defective. Within a short time after the new computer-controlled machines were put into service, an operator could complete 60 tubes in a half day with no rejects.

"All the tubes for the F-16 must be bent to critical tolerances," said Grace, a Fort Worth employee since 1956 and a General Foreman since 1977.

"A half-degree tolerance is all that is allowed, and we have to be extremely careful that a tube does not get more than five percent out of round. With these new machines, our operators can guarantee that high degree of quality."

After the tubes are bent to shape and specification, they have connectors applied to the ends and are pressure tested—some to 6,000 pounds-per-square-inch, twice the working pressure they are designed to withstand.

"Where the accuracy we strive for shows up is on the assembly line," Grace said. "With these new machines, we just don't get complaints like we used to."

than 190 PCBs an hour.

Gold is used on PCBs, because of its superior electrical conductivity. In addition, since it is a noncorrosive material, a layer of gold insures that connections remain intact.

"By adding the nickel layer, we can reduce the gold thickness from 50 millionths of an inch to 30 millionths of an inch," said Ray G. Burton, Manager of Manufacturing Operations at Rochester. "The plater allows much greater control of thickness variation and has eliminated any waste of gold that could be caused by putting more than the required amount on the PCB fingers."

Prior to last fall, the fingers on PCBs had to be chemically treated to remove solder and then hand scrubbed to prepare the surfaces for plating—a method which Burton said was slow and tedious. In addition, he said damage to the fingers was a serious problem, as was the problem of the gold peeling off from improperly cleaned surfaces.

Seventy percent of the PCBs produced at Rochester are used in Stromberg-Carlson's digital product lines, while the remaining 30 percent are sold to outside customers.

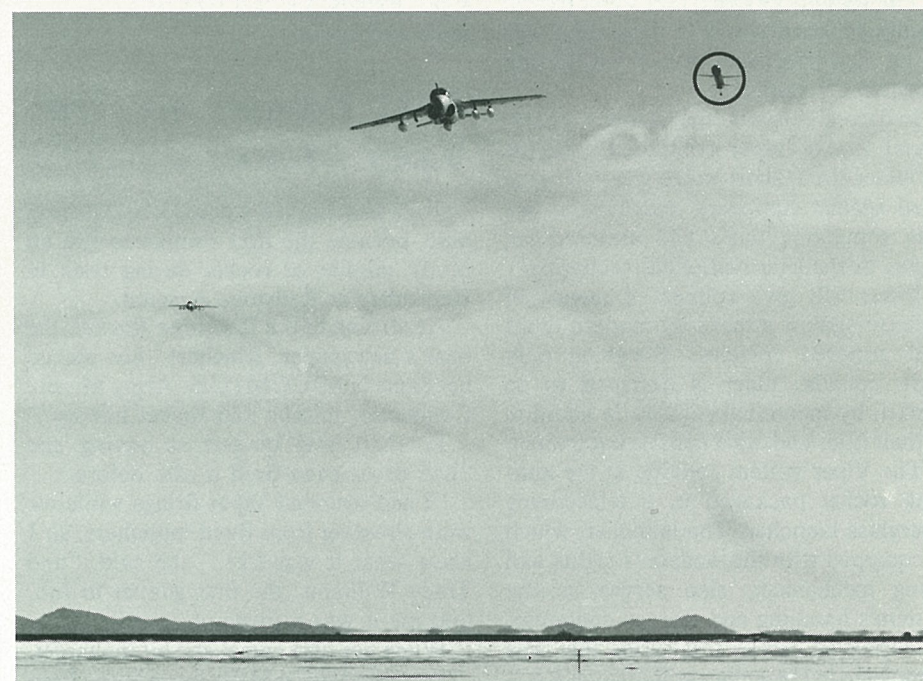
DMO Installation Brings Praise From Customer

The successful cutover of a Stromberg-Carlson 600-line System Century Digital Mobile Office (DMO) at East Lynn, W. Va., prompted this comment from Continental Telephone System's Division Manager, Harold J. Marshall: "Stromberg's performance for this installation rates higher than many of its competitors."

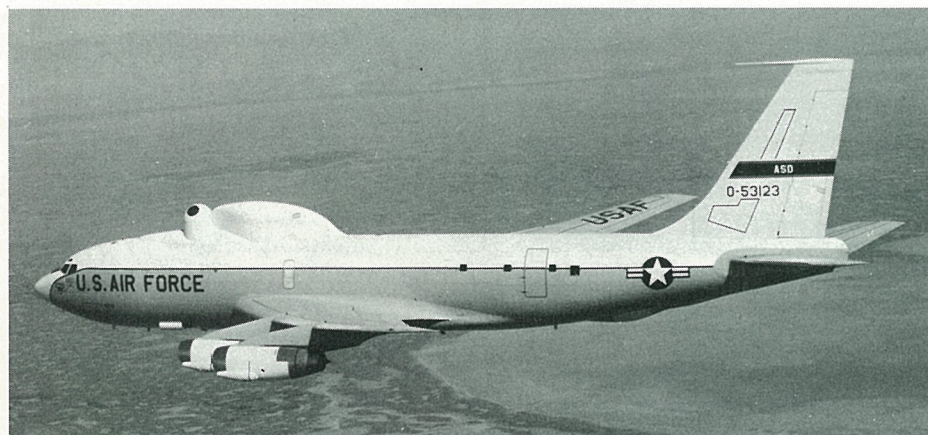
The DMO was the first digital central office installed in Continental's Allegheny Division, and it went very smoothly.

The DMO is a complete digital central office built into a transportable, environmentally-controlled, trailer-like container. Fully equipped and thoroughly tested at the factory, it arrives ready to provide immediate service without extensive site preparation or a long, costly construction cycle. The DMO is equipped with all of the latest custom-calling features, including call forwarding, call waiting, speed dialing and three-way calling.

Continental Telephone Corporation, based in Atlanta, Ga., is the third largest independent telephone operating group in the United States. The corporation has 16 System Century digital central offices in service, three in the installation phase, and 18 Digital Satellite Units at various sites in the process of being installed.



On Target. A U.S. Navy/Convair Tomahawk cruise missile crosses the California coast after being launched from an A-6 over the Pacific (top) and then approaches its target area after a 300-mile overland flight to Nevada (bottom).



The Airborne Laser Laboratory

Fort Worth Modified Aircraft Is Key Part of Laser Development

A laser weapon demonstrator was recently test fired for the first time on the ground from an NKC-135A aircraft that had been modified at Fort Worth.

Testing at Kirtland AFB, N. Mex., is to be followed later this year by an in-flight firing of the laser.

Laser is an acronym for light amplification by stimulated emission of radiation. It is a narrow, intense beam of light produced when gases flowing through the device are stimulated to high energy levels.

Former Air Force Secretary Hans Mark, who witnessed the successful test firing in the closing days of his term, was quoted by the Associated Press as saying he was satisfied "that we have in fact passed a very significant milestone, that the laser in the airplane is capable of firing at the full power level that we had in mind."

"In the longer term, I think we are going to put lasers in space and I think we're going to shoot down intercontinental ballistic missiles.

"I believe lasers in airplanes and in space will, in the next decade or so, become an important part of this country's strategic arsenal."

Use of the laser, Mark said, will allow "a large airplane to fly safely through a missile attack. What we're going to do in the tests... will be to shoot down surface-to-air missiles and air-to-air missiles. That's never been done before."

Since light travels at 186,000 miles per second, the potentially lethal beam from the laser would arrive almost instantaneously at the target, eliminating the need for leading the target. For example, it takes less than six-millionths of a second for a laser light to travel one mile. In that time, a supersonic aircraft flying at twice the speed of sound would move only one-eighth of an inch.

Fort Worth, under an Air Force con-

tract, is supporting the testing of the Airborne Laser Laboratory (A.L.L.) through its Electronic Programs Department and an off-site operation in Albuquerque headed by A.M. Veed.

Fort Worth's successful aircraft modification program was begun in March 1971 with the award of the first design contract.

One of the most important tasks of the initial design phase was to determine effects of mechanical and acoustical vibrations on the airplane since the precise alignment of the laser mirrors must be isolated from the normal flight environment.

In use, the laser device develops as much power as a jet engine and makes as much noise.

Development of the airborne laser weapon demonstrator has pushed the state-of-the-art in many areas.

The KC-135A was modified in three successive cycles to provide a flying laboratory for the development of new techniques in pointing and tracking, beam stabilization and high-power optics.

Power to operate the system is provided by four 70 KVA (kilovolt amperes) generators. The KC-135 normally flies with three 30 KVA generators.

A digital, multiplexed instrumentation system capable of monitoring and recording 700 signals was installed in the aircraft to collect the experimental data, and a 27-ton vapor-cycle air conditioning system was added to cool the control and instrumentation equipment.

The laser system requires many special safety provisions to protect the airplane and test crew, said Peyton Robinson, who headed the modification program.

The interior of the plane was divided into three separate, differentially pressurized compartments. An automatic fire detection and suppression system was installed in critical areas of the aircraft.

Pomona's Viper Rocket Begins U.S. Army Operational Tests

U.S. Army troops began firing Pomona's Viper antitank weapon during operational tests that started in mid-January at Fort Benning, Ga.

The soldiers reported that Viper had no significant recoil, and that sighting was better than with the Army's present Light Antitank Weapon.

In late February, the Army's operational test of Viper continued with the shoulder-fired, short-range weapon being fired against stationary and moving targets simulating tanks and armored vehicles in realistic battlefield scenarios.

Viper will give soldiers a means of defense against attacks by modern tanks and armored vehicles. Weighing only eight pounds, Viper is designed to be carried by individual soldiers in addition to their rifles and other combat equipment.

The Viper system consists of the antitank rocket packaged in a telescoping fiberglass launcher. The launcher, which is equipped with the weapon's sights and firing mechanism, also serves as the system's handling and storage container.

During an earlier test series that was completed in December at Redstone Arsenal, Ala., eight Pomona employees shouldered the Viper. They included: Toni Rinehart (see story below), E. J. Wilker-

son, Jay Martin, Tracy Williams, Jeff Smith, Rick Rome, Chuck Benner Jr. and Ron Aaron.

Each Pomona employee fired three Viper rounds, the last two being fired in rapid succession.

First Woman to Fire Viper Makes History

Toni Rinehart, a Pomona engineering aide, became the first woman to fire an Army missile or rocket during tests in December at Redstone Arsenal.

According to the Redstone *Rocket*, the base's newspaper, Rinehart "has etched her name in MICOM (U.S. Army Missile Command) missile and rocket history."

Rinehart was quoted as saying she "had never even fired a rifle before."

"I had watched Viper firings while we were shooting from fixed launchers, so I knew what it was like," she said, "and Tracy Williams, the first gunner to fire, told me it was a piece of cake."

When her turn came, she hit the target.

Rinehart later told the interviewer from the *Rocket*, "I was excited... I was scared; but I think this (being interviewed) is harder than firing Viper."

Around the World... ..in GD

CHQ: *Stuart W. Mackiernan Jr.* transferred from Convair and was promoted to Corporate Administrator - International Business Planning... *Kenneth L. Hefflefinger* joined as Internal Auditor.

Fort Worth: *E. J. Polasek* was promoted to Manager - Planning Controls F-16... *D. L. Pratt* to Manager, F-16 Change Management... *R. D. Ragsdale* to Logistics General Supervisor... *J. W. Rost* and *D. Smart* to Assistant Project Engineer... *D. L. Rutledge*, *G. N. Wilks* and *M. S. Gans* to Logistics Supervisor... *S. M. Smith* to Project Manufacturing Technology Engineer... *D. R. Stephenson* to Project Manager... *J. L. Tezak Jr.* to Logistics Group Engineer... *R. L. Wells* to Production Specialist... *D. T. Wesolka*, *G. L. Aiken*, *J. R. Brooks*, *G. D. Haltom* and *K. V. Parris* to Group Engineer... *N. G. Wunder* to Financial Supervisor... *J. D. Wilson* and *J. N. Edmondson Jr.* to Field Service Engineer... *P. H. Billman Jr.* to Chief, Support Program Management... *W. G. Booton* and *J. D. Engelland* to Engineering Manager... *W. J. Creamer* and *M. G. Fain* to General Foreman... *B. J. Hart* to Manufacturing Control Supervisor... *C. F. Howell* to Purchasing Agent... *G. K. McNatt* to Chief of Equipment Maintenance... *E. A. Parker* to Quality Assurance Engineer Senior... *H. B. Parnell* to Engineering Program Manager... *Timm L. Fair* transferred from St. Louis to Abilene Facility and was promoted to Controller... *H. Z. Scott* to Engineering Staff Specialist... *C. R. Sierra Jr.* to Manager, F-16XL Program Plans... *D. E. Sundstrom* to Engineering Chief... *R. L. Wells* to Production Specialist... *T. G. Cheatum* to Engineering Staff Specialist... *R. B. Lillie* to Project Manager.

Convair: *Richard F. Gibb* was promoted to Operations Project Representative... *Donald A. Nirschl* to Engineering Chief... *Dennis Uhlken* and *Hugh D. Kyler* to Group Engineer... *Sam O. Arimura* and *Neal R. Straub* to Standards Group Engineer... *William H. Bowersox* to Group Engineer - Facilities Planning... *Ray R. Brown* to Supervisor - Quality Assurance... *Otis W. Hensley Jr.* and *LeRoy R. Nottebaum* to Group Engineer - Quality Assurance... *Walter J. Taylor* transferred from St. Louis and was promoted to Administrative Chief.

Electric Boat: *Elmer Bodner* and *Vasilus Mastrandonas* were promoted to Ship Superintendent, Senior... *Brian Cooney*, *John McCall* and *Donald Simmons* to Foreman... *Alfonso Delacruz* to Supervisor, Design Services... *Glenn Patterson* to Nuclear Ship Superintendent... *Leo Cardinal*, *Aubrey Wilkinson*, and *James Vance* to General Foreman... *Paul Watrous* to Operations Personnel Administrator... *Edward Zubritsky* to Assistant Superintendent... *Todd Anderson* to Ship Superintendent... *Richard Arnold* to Nuclear Test Supervisor... *Donald Felicetti* to Trident Ship Manager.

DSS: *Wallter W. Magnus* was promoted to Data Systems Specialist - CDSC... *P. Sikorski* to Chief Data Systems - EDSC... *N. Holowaty* to Production Control Systems Specialist - EDSC... *D. Dydo* to Senior Production Control Analyst - EDSC... *L. Murphy* to Production Control Systems Specialist... *C. A. Otte* and *G. McLain* to Data Systems Specialist - WDSC... *J. L. Wilson* to Chief Data Systems - WDSC... *A. E. Ratermanis* to Supervisor, Data Systems - WDSC... *M. J. Bourne* and *W. R. Widmer* to Supervisor - Engineering Software - CDSC... *R. B. Gardner*, *R. D. Hollister*, *J. E. Lalonde*, *C. A. Ormston* and *J. D. McMahan* to Supervisor, Data Systems - CDSC.

Pomona: *Judith A. Avery* was promoted to Technical Publication Editor... *Scott A. Burton* to Material Liaison Representative... *Donald Fields* to Engineering Group Supervisor... *John F. Gilray* and *Everett J. Marttila Jr.* to Section Head... *Gerald D. Hurmence*, *Rickey L. Riley*, *Larry W. Kudray*, *Wade H. Mayo*, *David Waldman*, and *Michael J. Lindsay* to Group Engineer... *John F. Jacques Jr.* to Project Engineer... *James L. Kalland* to Project Representative... *John R. McCandlish* to Manufacturing Development Specialist... *Dwight G. Mitchell* and *Warren J. Seyfert* to Engineering Manager... *Joyce J. Hall* to Project Administrator... *Becky L. Hartkopf* to Chief, Cost Control... *Brent A. Holtzen* to Assistant Project Engineer... *Edward J. Knopf* to Superintendent... *Calvin E. Lemke* to Manufacturing Control Coordinator... *Joseph A. Pomeroy Jr.* to Manager, Department Administration... *Anthony J. Rentz* to Manufacturing Supervisor... *John M. Schaich* to Chief, Estimating... *David B. Taylor IV* to Electronics Engineer Senior... *James H. Thomas* to Chief, Manufacturing and Material Control.

Datagraphix: *Ronald W. Corley* was promoted to Project Leader - Marketing Software... *Vaughan B. Martell* to District Service Manager... *John E. Bowman* to Regional Account Manager - Supplies... *Moss H. Kendrix* to Government Program Manager... *Diana M. Schutz* to National Accounts Representative - Micrographics... *Charles J. Pelesky* to Sales Representative.

Electronics: *Roger W. Marx* to Project Manager - Operations.

Hill F-16s Deploy To Norwegian Base

The first tactical deployment of U.S. Air Force F-16s to Europe began recently with a non-stop flight by 12 of the fighters from Hill AFB, Utah, to Flesland Air Base in Norway.

The F-16 Fighting Falcons from Hill's 388th Tactical Fighter Wing are scheduled to participate in a NATO exercise. The purpose of the exercise is to familiar-

ize pilots and support crews with operating conditions in Europe.

The General Dynamics-built fighters were refueled en route to Norway by KC-135 Stratotankers. C-141 Starlifters ferried 300 Air Force maintenance and support personnel and a Fort Worth instrument and flight control specialist to the Norwegian base.

Corpus Christi To Be Launched At EB Apr. 25th

Electric Boat will launch its 13th 688-class submarine, *Corpus Christi*, on April 25th. The ship is the first of three nuclear attack submarines in this class which are scheduled to be launched at Groton this year.

Corpus Christi (SSN 705) will be christened by Mrs. John G. Tower, wife of Texas' senior senator. Senator Tower, who is Chairman of the Senate Armed Services Committee will deliver the principal address at the ceremonies.

Tower, a Republican and member of the Senate for 20 years, also serves on the Banking, Housing and Urban Affairs and the Rules and Administration Committees.

Corpus Christi is the first submarine and the second U.S. Navy vessel to bear the name of that Texas city. The first ship was a 304-foot-long frigate that served in the Pacific during World War II.

* * *

Attack Submarine Jacksonville (SSN 699) Delivered to Navy

The fast-attack submarine *Jacksonville* (SSN 699) was delivered to the U.S. Navy March 31st by Electric Boat.

The *Jacksonville* is the seventh *Los Angeles*-class submarine to be delivered by Electric Boat and the second delivered by the Groton shipyard since the first of this year. The USS *Bremerton* (SSN 698) was delivered in February and was commissioned during ceremonies at the Naval Submarine Base, New London, Conn., on March 28th.

Electric Boat holds contracts for 13 more of the 360-foot-long, 6,900-ton nuclear-powered attack submarines. The *Dallas* (SSN 700) is scheduled to begin sea trials this month.

Electric Boat also holds contracts for eight Trident ballistic missile-firing submarines and expects to deliver the first of these 560-foot-long, 18,750-ton ships, the *Ohio* (SSBN 726), later this year.

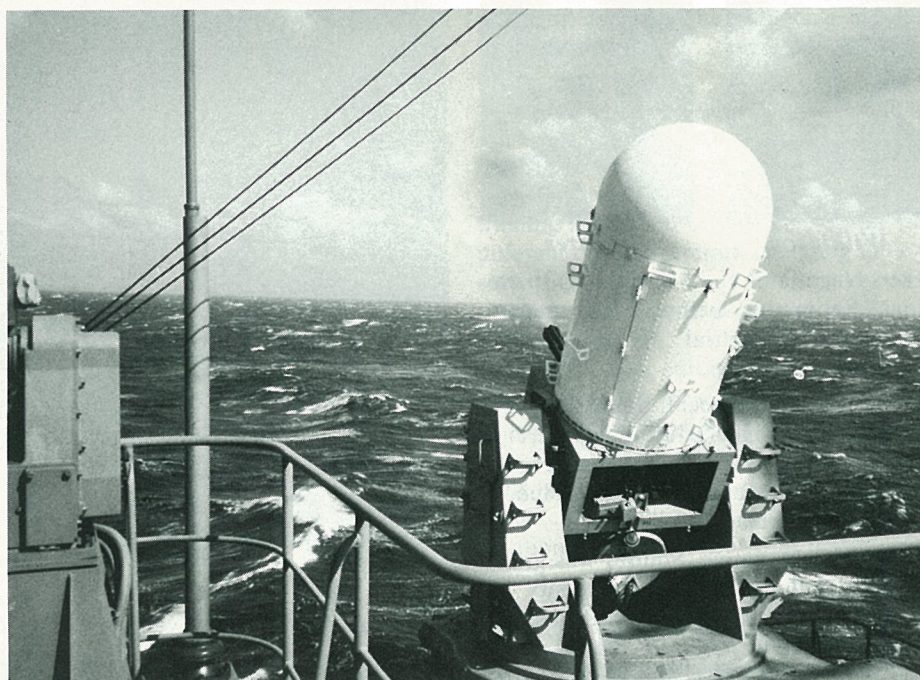


EB's Newest. Late last month, *Jacksonville* (SSN 699) became the second 688-class fast-attack submarine delivered by Electric Boat to the U.S. Navy this year. The 360-foot, 6,900-ton vessel is EB's seventh in the class.

GD World

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Test Firing. A Phalanx close-in shipboard defense gun system produced by Pomona is test fired from the *Kurama*, a recently commissioned Japanese Maritime Self-Defense Force destroyer. The *Kurama* is the first foreign vessel to be equipped with the system. Phalanx systems are presently installed on eight U.S. Navy ships.

Pomona's Phalanx Gun System Installed on Japanese Destroyer

Phalanx, the radar-controlled shipboard gun system developed by Pomona for the U.S. Navy, has been installed and test fired for the first time aboard a ship of another nation.

The test firings took place in the Sea of Japan aboard the *Kurama* (DDH 144), a newly-commissioned Japanese Maritime Self Defense Force (JMSDF) destroyer. Two Phalanx systems are installed aboard the *Kurama*.

Last year, nine personnel of the JMSDF received training at Pomona in the operation and maintenance of Phalanx. In addition to the two units aboard the *Kurama*, additional systems are on order for installation aboard other Japanese ships through 1982.

Phalanx has already been installed aboard eight U.S. Navy ships, including three aircraft carriers: the USS *America*, the USS *Enterprise* and the USS *Coral Sea*; four cruisers: the USS *Biddle*, the USS *England*, the USS *Jouett* and the USS *Belknap*; and one auxiliary command ship, the USS *LaSalle*.

The Navy has said it plans to place Phalanx on over 240 ships ranging from patrol boats to carriers.

Phalanx is designed to protect ships against sea-skimming missiles or aircraft that penetrate the fleet's outer defenses.

The gun system's unique defensive capability is based on closed-loop spotting, a breakthrough in radar technology. This technique uses advanced radar and computer technology to pinpoint targets and automatically and continuously direct the 20-mm. projectiles into the targets.

Because it is used against targets at close range, Phalanx effectiveness requires reaction time measured in seconds. The system achieves this fast reaction through radar technology which combines target search and tracking functions with the consistent accuracy provided by the closed-loop aiming.

Phalanx uses a six-barrel Gatling-type gun, electrically controlled, hydraulically driven and capable of firing 3,000 rounds per minute.

First AMRAAM Launch from F-16 Is Successful

The U.S. Air Force has announced the successful first launch of an Advanced Medium Range Air-to-Air Missile (AMRAAM) from an F-16 fighter over the White Sands Missile Range in New Mexico.

The ballistic launch of the AMRAAM development test missile took place in late February.

The Air Force statement on the launch said that it was the first of a series of AMRAAM flight tests directed at integrating the new missile with the F-16.

The purpose of the test was to demonstrate safe separation from the F-16 and to verify rail launch separation characteristics. The test missile contained a rocket motor, but no seeker, warhead or control systems. It was launched ballistically at an altitude of 20,000 feet with the F-16 flying at Mach 0.85. This test prepared for the launch of a guided test vehicle, which will contain a seeker and control system.

Centaur Team Wins Award From Space Club

The NASA/Industry Centaur Team, led by NASA's Lewis Research Center and Convair Division, has received the National Space Club's Nelson P. Jackson Aerospace Award.

The team was recognized March 27th during the National Space Club Awards Dinner in Washington, D.C., "for continuing excellence in the design, fabrication, and flight of Centaur high-energy upper stages," built by Convair.

The award was accepted by General Dynamics President Oliver C. Boileau on behalf of all team members, including Honeywell, Inc. (inertial reference unit); Pratt & Whitney Group, United Technologies (Centaur RL-10 engines); and Teledyne Systems Company (guidance system).

The recipient of the honor is selected annually by the National Space Club from the aerospace industry, the selected firm having been responsible during the preceding year for an outstanding contribution to the missile, aircraft and space field. The award is a memorial to the late Nelson P. (Pete) Jackson, one of the founders and past president of the National Space Club.

Howard Bonesteel, Atlas/Centaur Program Director, said, "This award really belongs to the dedicated and competent people in all Convair departments who produced the hardware and software that allowed Centaur to achieve its outstanding success. And, let's not forget the rest of the team. They responded to some tough challenges to make Centaur the reliable upper stage that it is."

Centaur has achieved an enviable record since its first test in 1962 by placing high-value payloads into geosynchronous orbit as an upper stage with the General Dynamics Atlas and Martin Marietta Titan launch vehicles. Over the years, Centaur has sent a variety of space probes, including Surveyor, Pioneer, Mariner, HEAO, Helios, Viking and Voyager, on planetary missions seeking to unlock the scientific mysteries of the universe.

* * *

Voyager Team Is Selected to Receive The Collier Trophy

Dr. Edward C. Stone, NASA Voyager Project Scientist, and the Voyager Mission Team have been selected to receive the 1980 Robert J. Collier Trophy for the space mission to the outer planets that collected basic new information about the Solar System.

Convair was part of the Voyager Team as its high-energy Centaur upper stage sent the two Voyager spacecraft on their final trajectories with pinpoint accuracy for their billion-mile odyssey through space following launches from Cape Canaveral, Fla., in August and September 1977. Last November, as Voyager 1 soared past Saturn, it transmitted spectacular television images of the distant planet, its satellites and rings, back to Earth.

The Robert J. Collier Trophy, called the 'Oscar' of the aerospace industry, is given by the National Aeronautic Association for the "greatest achievement in aeronautics or astronautics in America, with respect to improving the performance, efficiency or safety of air or space vehicles, the value of which has been thoroughly demonstrated by actual use during the previous year."

Wilkinson, Squires Appointed To New Positions at Convair

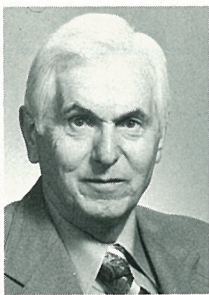
Two executive appointments have been announced at Convair by Leonard F. Buchanan, Vice President and Division General Manager. Sidney C. Wilkinson has been appointed Division Vice President and Deputy General Manager-Operations, and Edward M. Squires has been named Division Vice President-Production.

Wilkinson has been Division Vice President-Operations since December 1979, heading the Convair factory operations producing Tomahawk cruise missiles, Atlas-Centaur space launch vehicles, DC-10 and KC-10 fuselages and engine struts for the Boeing 767 jetliner.

From 1976 to 1979, Wilkinson assisted the F-16 program at Fort Worth, helping bring the fighter into full-scale production.

Following graduation from New York's Pratt Institute in 1934, Wilkinson began his aviation industrial career with Pratt & Whitney's tool division. He subsequently had assignments with Sikorsky Aircraft Corp., Kellett Autogyro Aircraft Co., and Republic Aviation before joining McDonnell Aircraft Co. in 1942. He was Vice President of Operations for McDonnell when he retired from that company in 1973.

Squires, who will report to Wilkinson, formerly was Director of Industrial Engineering & Scheduling at Convair. He started at General Dynamics as a Corporate Management Intern in 1970. The following year he was promoted to Industrial Engineering Supervisor at Convair and subsequently served as Senior Con-



Wilkinson



Squires

tracts Negotiator and Manager of Operations Estimating before being named Director of Industrial Engineering & Scheduling in 1979.

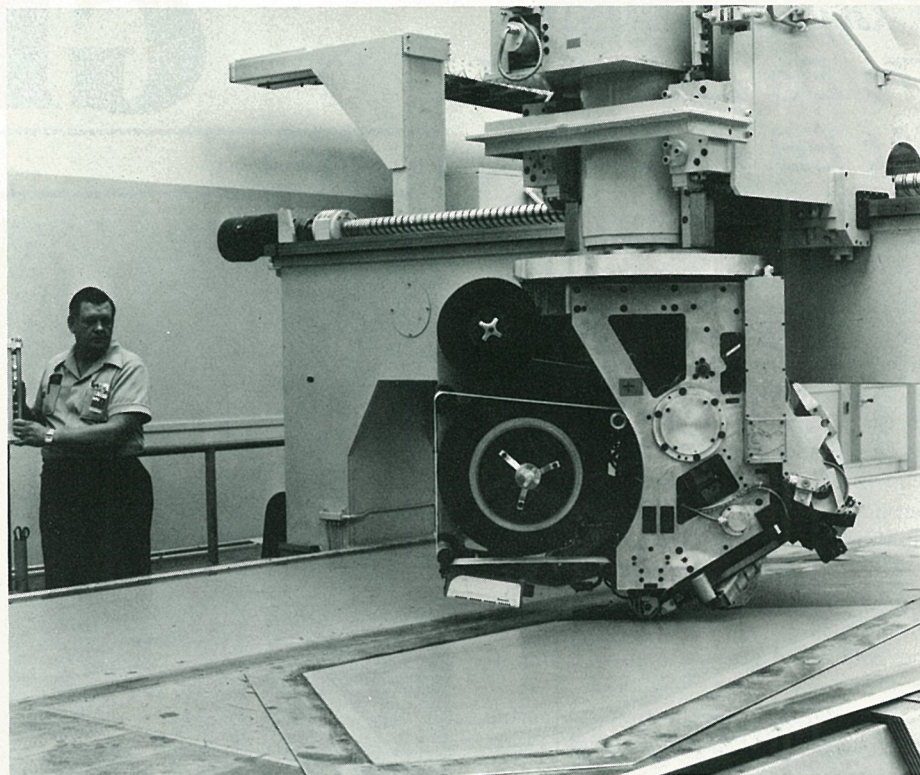
In his new assignment, Squires will be responsible for manufacturing engineering, manufacturing control, fabrication and assembly operations of aircraft, launch vehicles and cruise missiles.

A Kentucky native, Squires was graduated in 1963 from the University of Kentucky with a bachelor's degree in industrial engineering and management. In 1970, he received a Master of Business Administration degree in Finance from Creighton University.

F-111 Safety Award

The U.S. Air Force's 48th Tactical Fighter Wing, which flies F-111Fs from Royal Air Force Lakenheath in England, has won the 1980 Outstanding Unit Safety Award of the U.S. Air Forces in Europe.

The award cited the wing for having the best overall safety record in flight, ground and weapons safety of any other European-based tactical fighter wing.



Laying Tape. Fort Worth's R. L. Flow operates a tape-laying machine to form the composite material tail skins for the F-16.

Fort Worth to Install New Composite Tape-Laying Machine

Use of an additional composite tape-laying machine, scheduled to begin production in early 1982, will greatly increase productivity and enhance quality of the F-16 graphite/epoxy tail skins fabricated at Fort Worth.

The new machine, capable of laying one-inch- and six-inch-wide composite tape, will also play an important role in the manufacture of the highly swept cranked arrow wings that will be used on the F-16XL.

Composite aircraft parts are considerably lighter than conventional aluminum, yet offer increased stiffness. About 200 pounds of composite materials are used in the F-16's horizontal and vertical stabilizer skins. They range from twenty-five to five-hundred thousandths of an inch thick.

The graphite tape, which is impregnated with epoxy and is fifty-four ten thousandths of an inch thick, is built up layer upon layer to form the skin. After the required number of plies have been laid, the skins cure to complete the laminating process. Fort Worth completes 29 shipsets a month.

Material Service Introduces New Flowing Concrete

A new type of concrete has been introduced into the Chicago construction scene by Material Service Corp. Because it is highly workable and self-leveling, the new concrete has appropriately been named "Flowing Concrete."

Although still in its introductory stage, Flowing Concrete has performed very effectively in solving difficult situations for contractors, architects and engineers. The unique flowing properties of the new product allow easier pumping and faster placement of the concrete into narrow forms and between dense reinforcement where regular concrete can't reach.

Material Service's Flowing Concrete consolidates easily, produces smooth surfaces and sharp corners and has proved to be stronger and more durable than regular concrete. Flowing Concrete is economical for the contractor and owner, and its special properties allow an architect to use concrete not only as a structural but as an aesthetic component in the design of a building.

The more water that is added to regular concrete, the easier it can be handled, but too much water causes weakness. This apparent conflict between good workability and high quality is solved in Flowing Concrete through the addition of a chemical admixture. When the chemical is added, the original concrete becomes highly workable, allowing easy placement without sacrificing quality.

The cured skins are ultrasonically inspected for defects, automatically drilled and mechanically fastened or bonded to the tail or wing structure.

The use of composite material on military aircraft has been pioneered in Fort Worth. As early as 1965, Fort Worth engineers envisioned a machine that could lay up composite material with speed and accuracy.

Air Force Material Laboratory Technology and General Dynamics' Independent Research and Development programs led to the development of such a machine. A basic patent for a composite tape-laying machine, initiated by the Manufacturing Technology Department, was issued to General Dynamics, and the initial machine was fabricated by Conrac Corporation and installed in 1972. There are currently two tape-laying machines in operation at Fort Worth, a three-inch Conrac and a six-inch Ingersoll.

Prior to the introduction of composite tape-laying machines, the tapes had to be laid by hand at the rate of about one pound per hour. The current capacity of both machines laying tail skins is 16 to 20 pounds per hour.

With delivery of the new one-inch and six-inch combination machine, Fort Worth's composite tape-laying capacity will increase to about 45 pounds per hour.

Grant Davis, Supervisor in the Manufacturing Technology Department, has worked with tape-laying machines since 1978, and said that "With the installation of our new composite tape-laying machine and the continuing use of our current machines, we will be able to meet all foreseeable production rates and have a growth capacity to meet next-generation aircraft requirements."

Charleston Receives Contract to Build Drilling Rig Parts

Quincy Division's Charleston (S.C.) facility will fabricate components for four offshore drilling rigs under a \$33 million contract from Bailey & Shannon Drilling Co., Inc., of Stafford, Tex. The award involves construction of major portions of steel work on the rigs.

The components will be used in jackup drilling rigs with a 16,000-foot drilling capability and in workover rigs capable of drilling to 25,000-foot depths. The rigs will be used off the Gulf Coast.

This is the second contract that General Dynamics has received for major portions of steel work on offshore drilling rigs in four months. Last December, the firm was awarded a contract for components for two rigs. The new contract work will begin late this year with delivery of the components scheduled in 1982.

SSIP Contributions Let Retiree Smile All the Way to His Bank

All that talk about the company's Savings and Stock Investment Plan (SSIP) enabling an employee to build a sizable nest egg over the years isn't just idle chatter.

Consider the Electric Boat employee who retired recently at age 55 after just 15 years in the plan. Under the GD SSIP, the company adds a percentage contribution to each dollar the employee contributes. The plan provides a number of investment options and each year's company contributions and earnings vest three years later.

Over the years, the EB employee had contributed \$39,001. He retired with SSIP funds totaling \$176,831 in the form of cash and GD stock. Talk about smiling all the way to the bank!

Dividend Declared

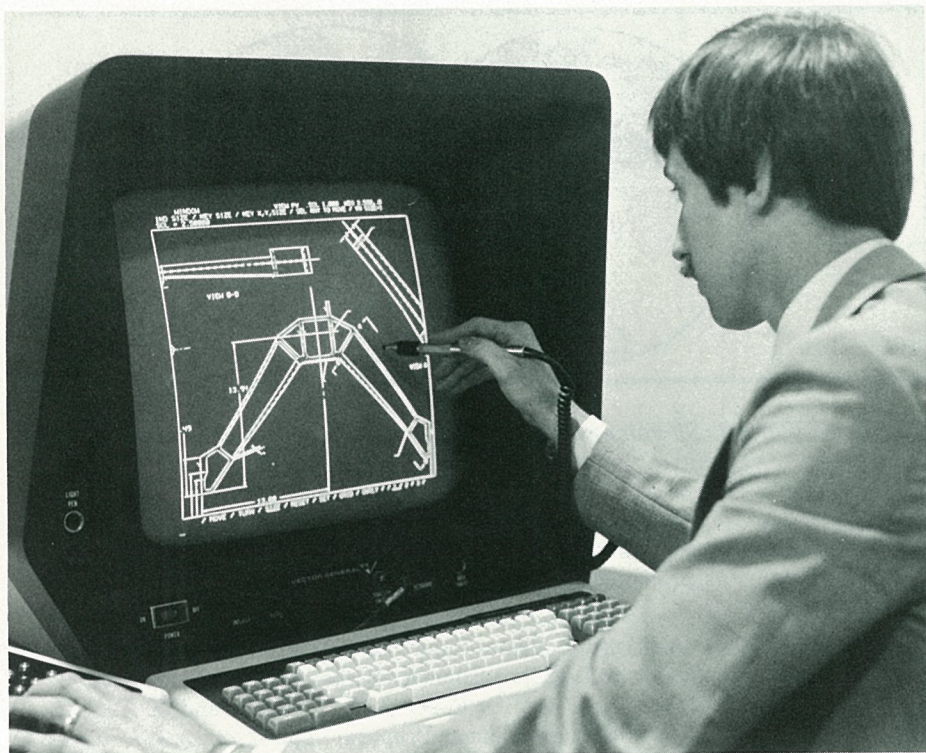
The General Dynamics Board of Directors has declared a regular quarterly dividend of 18 cents per share on the company's common stock and \$1.0625 on its Series A preferred stock, payable to shareholders of record on April 16, 1981.

The dividend on the common stock will be payable on May 18, 1981, and the dividend on the preferred will be payable on May 15, 1981.

Savings And Stock Investment Values

Salaried	Feb. 1979	Feb. 1980	Feb. 1981
Government Bonds	\$ 2.1107	\$ 2.3134	\$ 2.5356
Diversified Portfolio	1.2943	1.7238	2.0783
Fixed Income	—	1.0634	1.1746
Hourly			
Government Bonds	2.1102	2.3124	2.5329
Diversified Portfolio	1.3235	1.7591	2.1237
GD Stock	\$15.1250*	\$36.1250*	\$33.7500

*Reflects 2½ for 1 stock split of February 1979 and 2 for 1 stock split of November 1980.



Design by Computer. Fort Worth's Bill Widmer uses one of Fort Worth's computer-aided-design terminals.

CAD/CAM Applications Expanded In F-16XL Development Program

Computer-produced drawings are being used in the development of Fort Worth's F-16XL advanced tactical fighter and as the two F-16XL prototypes are fabricated, computers will guide the manufacture of parts and components as they are now doing for the standard F-16.

The F-16XL is the first Fort Worth program in which computer-aided design and computer-aided manufacturing (CAD/CAM) have been used from the beginning. Most of the design work of the F-16 Fighting Falcon had already been completed when Fort Worth's CAD/CAM system was installed four years ago, but some CAD work was performed for the F-16/79 Intermediate Export Fighter.

CAM has been a major element in the production of parts for the F-16. Now, additional work is being performed with the help of computers in drafting new designs and modification of existing ones.

CAD/CAM speeds up the drafting, design and manufacturing processes and insures greater accuracy and monetary savings.

Studies at Fort Worth have shown that CAD can increase drafting productivity by a factor of 10 or more, according to Bill Widmer, a Senior Software Engineer in the Central Data Systems Center.

Seated at one of the 44 computerized display stations, draftsmen can call up drawings that are stored in an IBM data

base. Using a light pen, the draftsman can modify drawings on the screen or can quickly generate new drawings on the screen. Once the drawing is completed, a printout or microfilm copy can be made almost instantly.

In designing parts, the computer can quickly give a mathematical description of the part and can furnish instant three-dimensional drawings and projections.

According to Mike Bourne, who is also a Senior Software Engineer, computer drawings are more accurate than those done by hand, and they eliminate the risk of error when changes are made.

"Under the old way, as a part moved from design to manufacturing, one drawing might have to be redone 12 to 15 times as it went through the different departments and steps," said Bourne. "Now, the drawings can be called up instantly for checking or modification from the central data base."

Manufacturing personnel can use the stored data to guide numerically controlled machine tools in cutting a part and quality assurance and tooling engineers can use the same data for automated inspection procedures.

Fort Worth Cost-Cutters Earn \$248,595

More than 1,800 Fort Worth employees earned a total of \$248,595 in awards for suggesting ways of cutting F-16 production costs by \$4.4 million during 1980.

The awards were made under the division's Cost Reduction and Value Control Program.

Two of those employees, J. T. Cockerham and Billy R. Pewitt, were awarded a total of \$15,835 for proposals each submitted.

Cockerham's award of \$10,000 — the maximum that can be given for a cost cutting suggestion — saved \$420,058. It called for deleting requirements that photolithographic negatives be used in printing some technical manuals and orders.

Pewitt was awarded \$5,835 for his suggestion that called for using less expensive cleaning materials during some assembly steps. The savings for the year were \$139,637.

Both Cockerham and Pewitt were recently given citations from the National Association of Suggestion Systems for their efforts. Richard E. Adams, Vice President and General Manager of the division, presented the citations.

Electronics Begins Delivery Of USAF Instrumentation Pods

Electronics Division has begun delivery to the U.S. Air Force of the first of a new series of airborne instrumentation pods for use with the division's mobile Range Measuring System (RMS) now at Nellis AFB, Nev.

The new pods, called Concept pods, are the newest airborne tracking pods to be developed by Electronics. They provide positional location of aircraft over a training range and can be carried on 14 different types of aircraft, including supersonic fighters.

Other RMS pods produced by Electronics include:

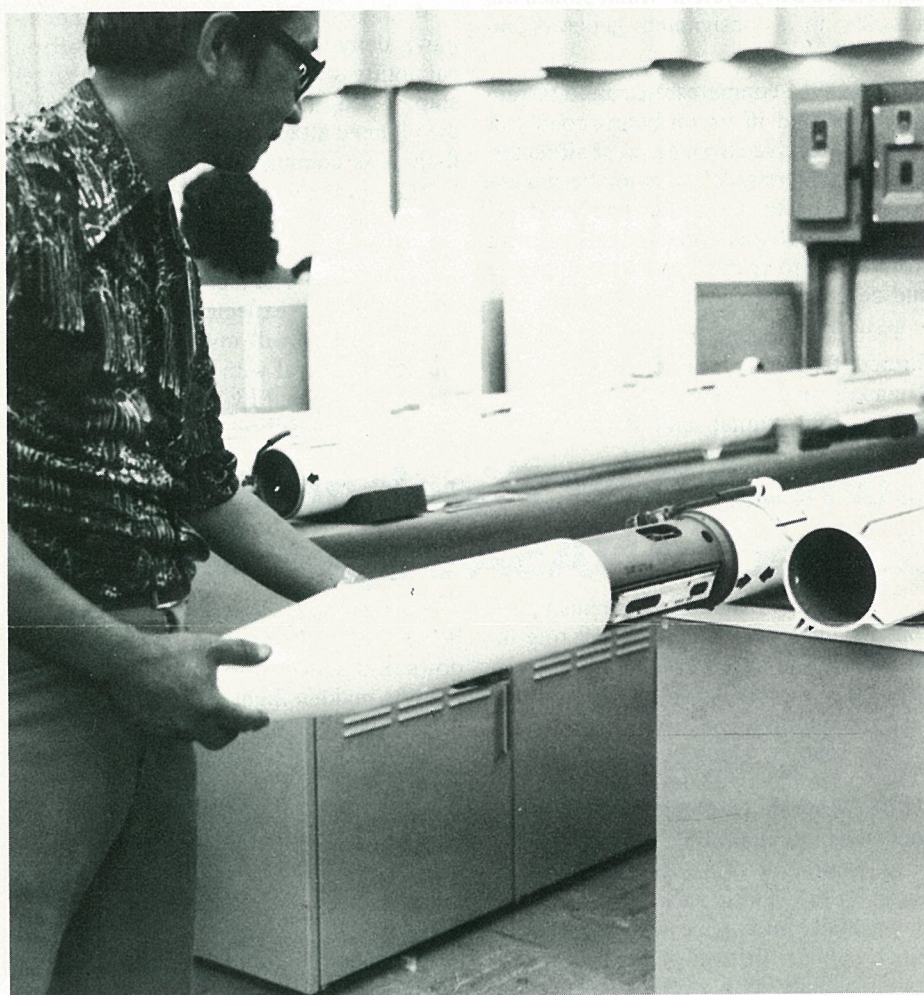
- APX-82s, subsonic pods that provide positional location data from the aircraft to RMS ground stations;
- SCORE pods, which provide aircraft weapons status, acceleration and attitude data in addition to positional location and can be flown at supersonic speeds;
- ACMI pods, which provide all the data available from the SCORE pod with

an enhanced computational unit and increased reliability.

The mobile RMS, developed by Electronics for the Department of Defense, is operated by General Dynamics personnel and has participated in 11 major air and ground exercises at various locations since 1972.

According to Don Hall, Electronics' Range System Program Manager, the division will deliver 60 Concept pods to the Air Force by mid-April. "In fact, we delivered the first 10 pods ahead of schedule, in response to a special request from the Air Force," Hall said.

Hall said that the new pods are being used by the Air Force in a series of exercises in the Nevada desert this spring and fall. A follow-on to last year's Gallant Eagle exercise, the 1981 program includes a joint service test to evaluate the effectiveness of both friendly and hostile electronic warfare during close air support operations in a conventional conflict.



Concept Assembly. Tho Phung of Electronics Division attaches the nose cone of a Concept pod, the newest airborne tracking pod developed for the U.S. Air Force by the division.

USAF F-16s Deployed to Norway Get High Marks for Performance

F-16s from the 4th Tactical Fighter Squadron (TFS) at Hill AFB, Utah, recently concluded the first overseas operational deployment of the Fighting Falcon with a 12-hour return flight from Norway to Utah.

During the month-long Norwegian deployment, 12 F-16s flew air intercept, air combat, air-to-surface and close support missions over the country's rugged mountains and fjords in joint operations with Royal Norwegian Air Force F-16s and F-5s.

The 4th TFS F-16s flew nearly 350 missions during the operational exercise, which was called Coronet Falcon. The USAF fighters were based at Flesland Air Station near Bergen on the Norwegian west coast.

Lt. Col. Gary A. Michels, who led the deployment, said that "during the full month that we were in Norway, we had only three days when we elected to keep the airplanes on the ground. This decision was not made because we were unable to fly, but because it would not have been possible to get any productive training out of the missions.

"This training exercise showed that we were able to fly from Flesland and as far as Bodo and Andoya (well above the Arctic Circle), complete a mission and return to Flesland, a distance of over 1,600 km (nearly 1,000 miles)."

Col. Michels said that the operations were conducted successfully despite the Norwegian winter weather conditions, which result in low cloud cover, poor visibility and icy and snow-covered runways.

"Without a doubt," he said, "we can confirm that our aircraft never had any difficulties handling these conditions."

The F-16s required only routine maintenance during their intensive flying program in Norway, achieving a high rate of mission capability.

"The airplane is effective in all respects," Michels said. "Foremost is the fact that it produces a considerable number of sorties simply because it is steady, operationally reliable and seldom needs to be taken out of service."

More than 380 Fighting Falcons currently are serving with the U.S. Air Force and the air forces of Belgium, Denmark, the Netherlands, Norway and Israel.

GD World

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Submarine Launched Tomahawk Flies 300 Mile Land-Attack Mission

A submerged submarine in the Pacific for the first time launched a conventional land-attack missile against a simulated ground target more than three hundred miles inland at Nellis AFB's Tonapah Test Range in Nevada on March 28th.

The land-attack missile was launched from the nuclear attack submarine USS *Guitarro* (SSN 665) while it was submerged in open water in the Pacific Missile Test Center's range off the coast of California. Moments after being ejected from one of the submarine's torpedo tubes, the missile breached the surface of the water under boost motor power and then transitioned to cruise flight powered by its air-breathing turbofan engine. The Tomahawk made landfall north of Santa Barbara.

The Tomahawk was equipped with a U.S. Navy-developed Digital Scene Matching Area Correlation (DSMAC) terminal update guidance system. DSMAC supplements the Terrain Contour Matching (TERCOM) system which guides the missiles to a designated geographical location.

TERCOM compares measured terrain heights stored in its on-board computer with data received from its radar altimeter, computes the missile's location from these data and adjusts its course. The DSMAC compares in-flight photo-optical data with stored data to refine final course update and zero the missile in on target.

Test data indicate that all systems performed flawlessly and once inside the Tonapah range the missile flew a fully guided conventional land-attack mission

over preprogrammed routes showing off its precision terminal accuracy while making simulated attacks on its target.

In a March 20th test, an antiship Tomahawk scored a direct hit on a target ship and successfully completed the fourth in a series of developmental/operational test flights.

The series of antiship developmental/operational test missions conducted by the Navy has demonstrated Tomahawk's ability to seek, locate and attack ships at sea.

Following is a chronology of the previous three developmental/operational tests:

- January 15th – For the first time a Tomahawk antiship missile terminated flight with impact on target ship. In the previous 20 test flights of the antiship Tomahawk, the missiles overflew the target hulks on simulated target strikes.

- January 21st – Tomahawk again scored a direct hit on target ship after being launched from a submarine at sea.

- January 23d – Although the Tomahawk demonstrated its over-the-horizon capability to search for and locate a target ship at sea, a difficulty occurred during the planned attack phase and the missile's flight was command-terminated.

The latest test concludes the developmental/operational test phase of the antiship Tomahawk during which the missiles were equipped with inert warheads. Operational tests are expected to begin in early summer. They will involve eight flights, including several with live warheads, and will be conducted by the Navy's Operational Test and Evaluation Force.

Convair-Built Fuselage Section Soared on NASA's Space Shuttle

The design skills and craftsmanship of Convair employees played a key role in the historic first flight of the Space Shuttle 'Columbia' in mid-April.

The Columbia's 60-foot-long mid-fuselage section, which houses the spacecraft's cargo bay, was designed and built in San Diego by Convair employees for Rockwell International, the Shuttle's prime contractor. The cargo bay is the reason for the Shuttle's existence – carrying payloads into space with a reusable launch vehicle, instead of expending the launch vehicle with every launch of a satellite or manned vehicle.

Convair received its first contract to build midfuselage sections in 1973, and the first fuselage was delivered to the Rockwell plant at Palmdale, Calif., in March 1975, the first piece of the Shuttle to be delivered.

In designing and building the mid-fuselage section, Convair pioneered the use of boron-aluminum tubing in the

structural trusses. This proprietary process helped keep the weight of the Shuttle down and added to its payload capacity.

In its maiden flight, the Shuttle carried no payload, but did carry instrumentation in the cargo bay to measure systems performance during takeoff, in orbit and during re-entry and landing. The cargo bay also carried the heat radiators which kept the systems of the Shuttle cool during exposure to the direct rays of the sun.

During the flight, the payload bay doors were repeatedly opened and closed to test the system in the vacuum of space and to use the radiators for cooling.

Plans are for the Shuttle, or the Space Transportation System as NASA calls it, to carry a variety of military, civilian and commercial satellites and space probes into low Earth orbit. The payloads will then be boosted into higher orbit or onto their interplanetary missions by another booster. Convair's Centaur has recently been selected by NASA for this purpose for the planned Galileo Jupiter mission in the mid-1980's.

100th F-16 Built In Europe Delivered

The 100th F-16 fighter produced in Europe was delivered to the Royal Netherlands Air Force in mid-March.

The two-seat fighter was the 365th F-16 produced by the three integrated final assembly lines, located in Gosselies, Belgium; near Amsterdam in the Netherlands, and at the Fort Worth Division.

The 100th European F-16 was delivered from the Dutch assembly line at Fokker's Schiphol Airport facility.

Nearly 2,000 F-16s currently are planned for production, and the two European assembly lines are currently scheduled to assemble 370 of the advanced fighters.

The F-16 multinational coproduction program is the largest international military manufacturing program in history and was established in government-to-government agreements in 1975. Industries in Belgium, Denmark, the Netherlands, Norway and the United States are producing structure, systems and equipment for the F-16.

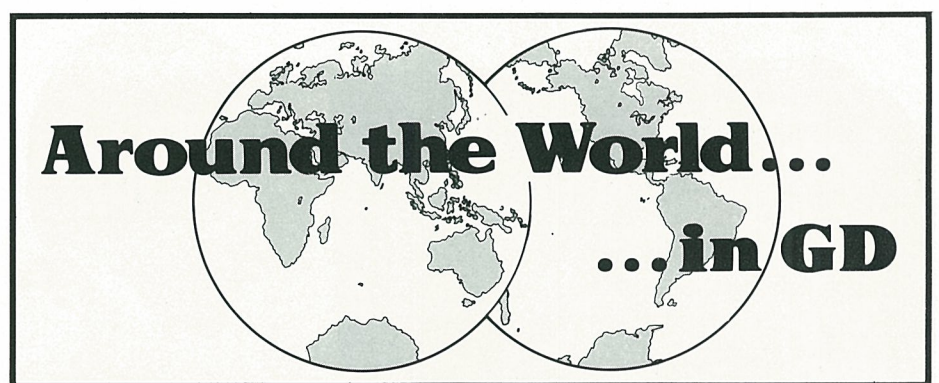
Australian Official Receives Briefing On F-16 at Fort Worth

Australian Secretary of Defence William B. Pritchett recently visited Fort Worth and received a briefing on the F-16 program from Richard E. Adams, GD Vice President and Fort Worth General Manager.

The Australian defence minister discussed potential F-16 manufacturing participation by Australian industry and toured the F-16 assembly line.

The F-16 is a finalist in the competition to select a new tactical fighter for the Royal Australian Air Force.

Secretary Pritchett was accompanied to Fort Worth by Adm. John Davidson, Chief of the Defence Force Staff at the Australian Embassy in Washington, and by Royal Australian Air Force Group Capt. Bruce Grayson, who heads the Tactical Fighter Project office at the embassy.



CHQ: Clifford R. Shannon was promoted to Corporate Manager Financial Plans and Reports . . . Arthur J. Cohen to Corporate Financial Analyst-Commercial . . . Douglass R. Pratt joined as Corporate Senior Financial Analyst . . . Edward J. Stiften was promoted to Corporate Manager Financial Analysis . . . Francis L. Asbury joined as Corporate Marketing Manager-Korea . . . William M. Hughes transferred from Fort Worth and was promoted to Corporate Manager Financial Planning.

Fort Worth: E. R. Abate and K. J. Arther were promoted to Chief-Finance . . . J. W. Arendall and D. F. Larsen to Logistics Supervisor . . . R. I. Bacus Jr. to Financial Supervisor . . . R. G. Barnes to Logistics Engineer Senior . . . E. J. Berkovsky, W. B. Halbrook and G. L. Magee to Group Engineer . . . T. R. Byers and G. E. Dean to Chief of Logistics . . . J. S. Caddell to Change Proposal Supervisor . . . J. L. Everidge to Quality Assurance Engineer Senior . . . W. J. Lawrence to Quality Assurance Field Engineer Senior . . . L. F. McFarland to Inspection Supervisor . . . N. J. Mellot to Assistant Project Engineer . . . G. E. Parker to Project Coordinator . . . J. A. Ray Jr. to Logistic Engineer . . . G. R. Sadow and K. G. Timpson to Project Engineer . . . B. Strange to Manufacturing Manager at Abilene . . . D. W. Thomas to Quality Group Engineer . . . R. A. Wright to Program Analyst Senior.

Groton: Calvin Barton and Alan Caval were promoted to Construction Management Career Development Trainee . . . William LaBonte, Robert Sterritt, Michael Williams, Allan Johnson, and Robert Renza to Senior Field Engineer, Reactor Plant Services (RPS) . . . William Robinson to Foreman-Dosimetry . . . Donald Rowley, Roy Adamson, Jeffery Balestracci, Larry Buckowsky, Mahlon Currier, Edward Deming, Mark Makoid, Clifford Swirski, Matthew Thomasian, Frank Veit and Robert Wood to General Foreman . . . Roy Wagner to Labor Relations Representative . . . Wilbert Zurliene to Supervisor Engineering, RPS . . . John Anderson, Scott Bussinger, William Gerety, John Hagglund, Barry Haslett, Matthew Hoagland, Thomas Kennedy, Robert Kiefer, Gregory Machinski, Martin McCormack, James McGoldrick, Donald Miller, Kirk Nassetta, Edward Oliu, Lee Piggott, Michelle Roybal, James Szivos, Donald Wiwczar and Timothy Worth to Foreman . . . Eugene Frank to Supervisor of Laboratory Services . . . Cornelius Gannon, Edwin Keeney, and Thomas VanMameren to Foreman, RPS . . . William Hill to Director Operations – Nuclear & Waterfront . . . William Miller to Ship Superintendent . . . David Murphy to Supervisor, Engineering . . . Eugene Netz to Insurance Administrator . . . Raymond Panciera to General Foreman, RPS . . . Norman Strom to Group Trade Planner . . . Dodson Walker to Supervisor of Configuration Management . . . James Henley to Ship Superintendent, Nuclear.

Quincy: John Jacobs was promoted to Special Project Manager . . . Rivard Damon to Manager, Ships & Facilities . . . Harold Butcher and James Geddes to Foreman-Quality Assurance . . . David Lewis to Foreman-Shipfitting . . . Richard Brown to Administrative Manager-Charleston . . . Terrance Egan and Robert Fuller to Design Engineer . . . Albert Coulombe to Project Control Chief . . . Gerald Gallinaro, Ralph Grundy and Richard Robbins to Engineering Supervisor . . . Robert Lovett to Senior Design Engineer . . . Leroy Bennett to Program Manager . . . Joseph Churma to Controller-Charleston . . . Paul Whiting to Assistant to General Manager . . . Jacob Kubo to Program Planning Specialist . . . Charles Gordon to General Superintendent-Welding . . . Peter Doolan to General Superintendent-Assembly . . . Nicholas Camillone to Superintendent-Chipping and Burning . . . John Ackerly to General Superintendent-Erection . . . Marcel Lariviere to Superintendent-Shopfitting . . . John Leydon to Superintendent-Outside Machinists . . . E. Jeff Pontiff to General Superintendent-Services . . . Robert Renn to Director, Barge Programs . . . Robert White to Manager, Outfitting Trades . . . Robert Dobbins to Time Keeping Supervisor . . . Lloyd Walker to Chief of Financial Reporting . . . William Northington and Frederick Bridge to General Foreman . . . Daniel Gale to Quality Assurance Engineer . . . Arthur Bowness and Michael Casey to Senior Program Planner . . . Bruce Bird to Assistant Superintendent . . . William Sepeck to Superintendent . . . Richard Gale to Manager of Marketing . . . Joseph Henderson to Project Control Chief.

DSS: D. Fonseca was promoted to Software Design Specialist at EDSC . . . V. E. Chiles Jr. to Chief-Financial Control at CDSC . . . H. M. Sinnen to Manager, Product Software at WDSC.

Pomona: C. B. Head, R. D. Contreras and J. R. Sogge were promoted to Quality Assurance Specialist, Senior . . . M. Houston and G. Wilson to Quality Assurance Specialist . . . R. J. Nagle Jr. to Master Schedule Administrator . . . A. A. Bridgewater and S. Surleta to Project Representative . . . J. L. Dinicola to Project Engineer . . . C. J. Kubes to Engineering Specialist . . . D. Marquez to Design Specialist . . . S. J. Pipher and G. V. Kersbergen to Section Head . . . L. F. Scheetz Jr. to Engineering Manager . . . A. Calomino to Estimating Administrator . . . C. L. Johnson to Group Engineer.

Datagraphix: Louis R. Cappello was promoted to Manager, Purchasing . . . David R. Carlson was promoted to Production Scheduler Senior . . . Daniel H. Clifford to Manager, Facility-Plant Services . . . William A. Hickmott to Regional Service Manager . . . Jerald L. Froschauer to National Account Manager . . . Susan V. Gregory to Accounting Supervisor . . . James P. Debus to Manager, Product/Operations Planning & Distribution.

American Telecommunications Corp: Tim Kuhlman was promoted to Corporate Controller . . . Robert Johnson to Manager, Management Systems . . . Ken Graham to General Supervisor, Operations.

Electronics: James E. Lake was promoted to Program Manager . . . James Lauerma to Logistics Program Coordinator.

Convair: John N. Coulson was promoted to Group Engineer . . . Billy J. Griffin to Chief-Production Engineering . . . James C. Martin to Operations Supervisor-Manufacturing . . . Kenneth Odom to Engineering Chief . . . Arthur E. Regopolas to Manager-General Procurement . . . Edward N. Stelmach and George R. Vollmer to Tooling Supervisor . . . Donald R. Briggs to Electronics Engineer, Senior . . . David H. Corbeille to Accounting Specialist . . . Thomas H. Merrill to Chief Engineer-Estimating . . . Allen L. Vinzant to Engineering Manager.

Earnings Total \$30.8 Million in Quarter

Status of Submarine Programs Discussed by David S. Lewis At GD Shareholders' Meeting

General Dynamics on May 7th announced that its earnings for the first quarter of 1981 were \$30.8 million, or 56 cents per share, approximately 15 percent lower than the \$36.3 million, or 67 cents per share, in the first quarter of 1980.

David S. Lewis, Chairman of the Board and Chief Executive Officer, told shareholders attending the company's Annual Meeting in St. Louis that the results reflected the continued impact of the slow economy here and abroad on the company's commercial businesses.

Sales during the first quarter of 1981 were \$1.27 billion, compared to \$1.07 billion during the same period in 1980.

In his report to the shareholders, Lewis said, "We are now well along in a year that will probably be a difficult one for American industry. The economy will probably continue to be soft in the near-term, but we believe General Dynamics' inherent technological and management strengths and the excellent mixture of government and commercial business will soon see us back on our long-term growth schedule.

"We are committed to continue our heavy research and development activities, even in those commercial areas where operations are currently depressed," Lewis said.

During the meeting, Lewis spent a considerable portion of his address responding to what he termed "unfair and ill-informed criticism" the submarine programs at Electric Boat have received recently. His comments are quoted below:

"As we have discussed in previous reports to the shareholders, Electric Boat encountered serious problems resulting from having received from steel mills and installed in the ships significant amounts of steel that did not meet specifications; from cases of poor welding by Electric Boat workers in certain areas of the ships; and from some quality control problems. These conditions, which were discovered by Electric Boat personnel, began to impact operations severely beginning about a year and a half ago. Immediately, Electric Boat management's attention was focused on correcting these conditions and on establishing procedures to insure that these or similar situations would not occur again. Over the past many months, those conditions had been largely corrected and Electric Boat was

once again reaching the high standards of production performance which they had reached prior to the discovery of the problems. Early this year, Electric Boat's management advised the Navy that Electric Boat expected to deliver six SSN 688 attack submarines and the first Trident ballistic missile submarine in 1981 — an unprecedented performance but one that we felt confident we could accomplish with full Navy support.

"For these reasons, we were more than shocked when the Secretary of the Navy, having had no discussion with the company, saw fit to cancel competitive procurement processes and unilaterally award contracts for three 688 submarines to Newport News, while holding the remaining one planned for procurement in 1981 for further consideration. In a letter advising of the Navy's action, the Secretary outlined an extensive number of very serious problems which he stated were existent at Electric Boat. In spite of our strong verbal protest, the ill-considered procurement decision was allowed to stand.

Committee Report

"At our request, the Secretary appointed a committee to determine the true current status of Electric Boat's operations and it gives me great pleasure to tell you that the committee's report, which was released last week, stated that the conditions mentioned in the Secretary's letter were no longer major problems and therefore would have no impact on submarine delivery schedules.

"While this affirmation of the improved health of Electric Boat is encouraging, it hardly compensates for loss of business that rightfully should have been awarded to Electric Boat. This is particularly ironic in view of the fact that over the past few months the new \$116 million semi-automated submarine cylinder and frame fabrication and assembly plant at Quonset Point, Rhode Island, came on stream for the first time. With this facility, Electric Boat should be in a very advantageous competitive position for submarine procurement in the future.

"Incidentally, we have already delivered two of the six SSN 688s scheduled for delivery this year. The third has completed initial sea trials and we expect delivery in about six weeks. Work on the other three submarines is progressing

well, with deliveries scheduled during the third and fourth quarters.

"With respect to the Trident, we expect the first sea trials of the first ship, the *Ohio*, will begin in about six weeks. As might be expected with a highly sophisticated and complex system of this sort, the first sea trials will be a long and very intensive shakedown process designed to uncover any shortcomings in the ship or its systems, many of which are purchased by the Navy from other contractors and supplied to Electric Boat. Assuming that there are no significant delays resulting from problems uncovered during the trials, the first Trident should be delivered in late October of this year.

"With all of the controversy surrounding the Navy's 688 procurement decision, the Secretary decided it was inappropriate to exercise the Navy's option to contract for the ninth Trident submarine before the option expired on 31 March. The Navy has now stated its intention to contract for the ninth Trident, hopefully by August. This entire series of events is most unfortunate since Electric Boat had firm pricing commitments with major suppliers of materials and equipment which expired on 15 April. It will now be necessary to start the entire negotiation process all over again, with easily foreseen results.

"While this has been a very painful experience, we are confident that the future of Electric Boat is bright indeed. We have the best submarine design and engineering organization in the Free World, we are very well facilitated and we have the only facilities large enough to build the Trident, which figures so largely in our nation's defense plans. We recognize this imposes a special responsibility on us and we have every intention of meeting that responsibility."

Continued on Page 4

Corpus Christi Is Launched At Electric Boat

A chilly spring wind didn't deter the more than 8,300 spectators and guests who attended the April 25th launch of the *Corpus Christi* (SSN 705), the 13th 688-class fast-attack submarine to hit the water at Electric Boat.

Umbrellas and rain coats at the ready, guests, employees and their families lined the large construction platform adjacent to the building ways area to watch the 360-foot, 6,900-ton vessel plow stern-first into the Thames River as tugs stood by to take her in tow.

Seconds earlier, Mrs. John Tower, wife of the Chairman of the Senate Armed Services Committee, had spoken the time-honored words, "In the name of the



Mrs. Tower Christens *Corpus Christi* United States, I christen thee *Corpus Christi*. May God bless her and all who sail in her." She then smashed a bottle of champagne on the bow plate.

Mrs. Tower's action signalled "Trigger Man" Joseph DeBarros, an EB Painter Foreman, to shove forward the trigger that released *Corpus Christi* for her slide into the river.

With more than 20 television news cameras and 80 news media representatives recording the event, the sub, whistle

Continued on Page 4

Convair Delivers 2 Tomahawks For Use in Navy Operational Tests

Convair has delivered the first Tomahawk sea-launched cruise missiles that will be used by the U.S. Navy in a series of operational tests beginning this summer.

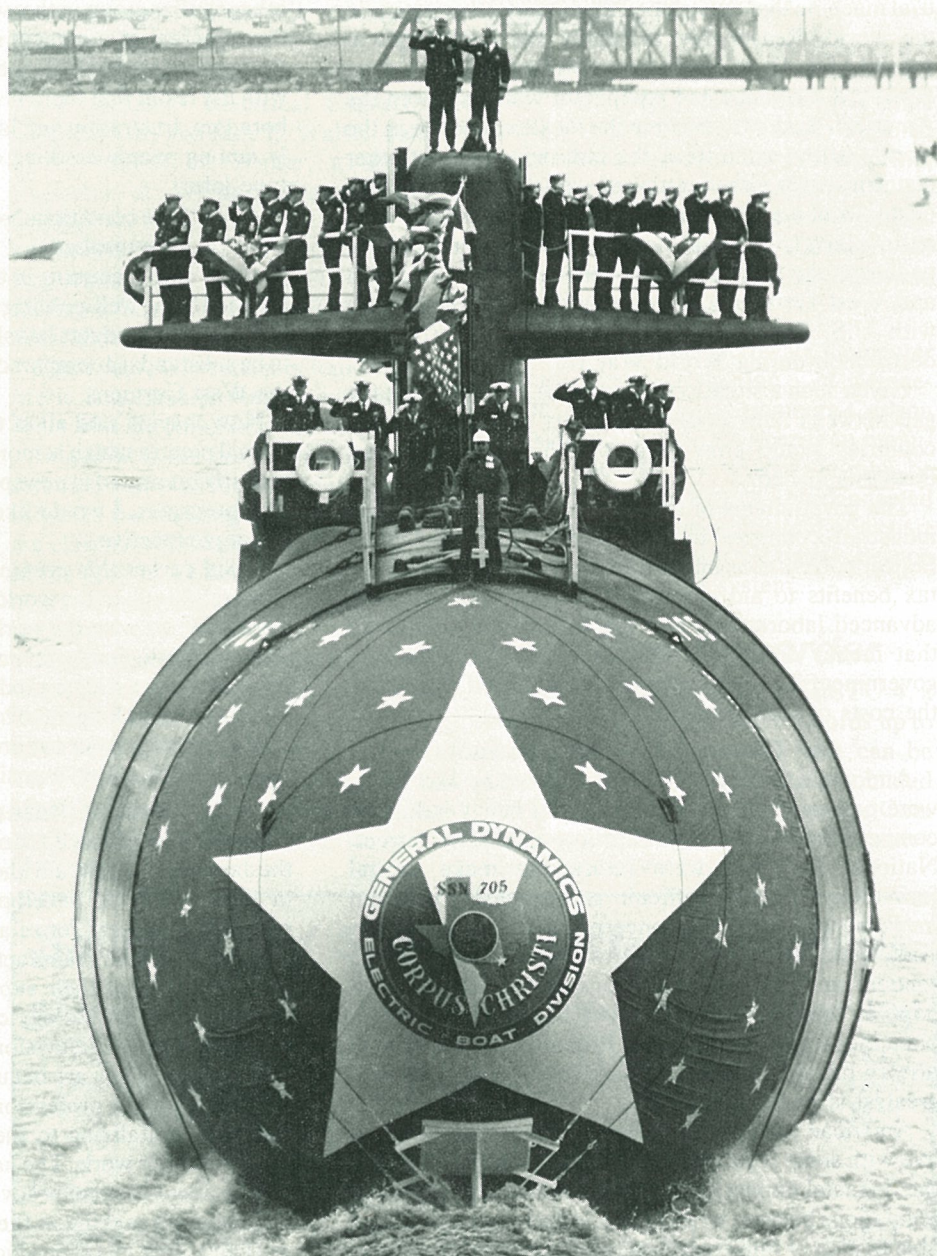
Two Tomahawk antiship missiles were delivered, on schedule, for the operational test and evaluation (OPEVAL) phase of the program. They are scheduled to be launched from the nuclear-powered attack submarine USS *Guitarro* (SSN 665) in tests conducted by the Navy's Operational Test and Evaluation Force.

The Tomahawk missiles will be programmed to carry out long-range, over-the-horizon missions in order to demonstrate their ability to seek, locate and attack ships. All are planned to hit the targets, with some missiles delivering live warheads.

Convair-built Tomahawks concluded a series of successful developmental tests/operational tests (DT/OT) in March. These tests paved the way for start of OPEVAL and the eventual Initial Operational Capability of the submarine-launched antiship Tomahawk next year. Unlike early trials in which the missiles overflew target ships on simulated strikes, the DT/OT tests were the first in which the Tomahawk hit the target ships.

Convair is the prime airframe contractor for the Tomahawk sea-launched cruise missile for the Navy and the Tomahawk ground-launched cruise missile for the U.S. Air Force. The division is also developing the medium range air-to-surface missile for the Air Force.

All three programs are under the direction of the Department of Defense's Joint Cruise Missiles Project.



Launch! Crew at attention, the 688-class fast-attack submarine *Corpus Christi* (SSN 705), named for the Texas Gulf Coast seaport, slides into the Thames River at Groton April 25th, from her building ways at Electric Boat. The 360-foot, 6,900-ton vessel is the 13th of her class to be built at the Groton shipyard.

David S. Lewis:

American Industrial Leadership Can Be Regained

An optimistic assessment that America can regain its industrial momentum was given by General Dynamics Chairman David S. Lewis in an address to the engineering alumni of Washington University of St. Louis on April 30th. Lewis is a member of the Board of Trustees of the university.

I would like to talk this evening about the well-publicized problems in the American economy resulting from what has been described as a relative reduction in the productivity of American industry compared to that of some other industrialized countries in the world, particularly Japan and West Germany. Those problems have certainly had traumatic impact on the American automotive and television industries and on some others. However, I think that our country has ample time and the resources to reverse this trend before it becomes more widespread. Without question, the key to a reversal and to regaining the American industrial vitality lies in the effective use of advanced technology.

Most Americans living today grew up in an environment where our country was considered the unquestioned world leader in virtually everything. We had the world's greatest and most efficient productive capacity. We were the world's leading exporter. We were technologically inventive and innovative. Our people enjoyed far and away the highest standard of living, and American producers set the world's standard for product quality.

For most of our nation's history, particularly in this century, the United States has exemplified progress and growth. In the quarter century beginning with the end of World War II, our country's rate of growth was nothing short of phenomenal. Over those years, our gross national product more than quadrupled, increasing from slightly over \$200 billion in 1945 to \$982 billion in 1970.

During those years there were many highly important inventions and major developments emanating from many countries in the developed world, including the United States, but only in the United States was there a strong, vigorous and continuing effort to capitalize on

"Most Americans living today grew up in an environment where our country was considered the unquestioned world leader in virtually everything."

those technical breakthroughs. Gradually, there was created an increasingly more powerful American industrial machine that outstripped that of any other nation in the world. Reasonably favorable tax laws made it possible for American industry to invest in the most advanced machines and equipment which allowed the American worker to become the most productive in the world. At the same time, the industries of most other countries were either equipped with old and relatively obsolescent machinery and equipment and were unable or unwilling to make the necessary investments to keep pace with the United States or, as in the case of Japan and West Germany, were rebuilding their industries with U.S. financial support after their nearly total destruction during World War II.

Given such a situation, it would be expected that the gap between American productivity and that of other countries would grow greater with time – but a few things happened.

The governments of what are now the other leading industrial countries took a page out of the United States' book and began to provide extremely attractive tax benefits to aid companies in providing the most advanced laboratories and machinery and equipment that money could buy. And in many instances, the governments actually subsidized or shared directly in the costs of their modern facilities.

Our Country Went Into Retreat

And while those countries like Germany and Japan were preparing for the next period of heavy industrial competition, our country went into a massive retreat. National tax laws were revised to make capital formation far more difficult and to make personal investment in industrial concerns much less attractive. And worst of all, our government imposed such a random multitude of regulations on industry that all hope of continuing a program of heavy investment in plant modernization was lost. Probably never before in history has any nation so effectively wrecked its own greatest strength.

American industry had learned through the years to live with some regulation, but in the decade of the '70s the financial impact of the wildly escalating number of regulations became so great that industry was no longer able to plan or implement aggressive facility expansion programs. The regulatory agencies had a field day, with no apparent sense of responsibility for the side effects of their regulations. For example, it was impossible to get the top people in the Environmental Protection



David S. Lewis

Agency to recognize that their determination to have industry meet extremely demanding clean air and clean water standards on unrealistically short schedules would require that industry spend the great majority of its available capital funds to clean up its effluents, and thus have only a very small portion of budgeted capital funds available for investment in advanced machinery and equipment. For the first time, the well-planned, year-by-year upgrading of American production capability was very nearly brought to a halt.

As could be expected, with costs increasing in all other areas of the economy, manufacturing production costs could no longer be controlled by increasing the American worker's productivity with more efficient industrial equipment. This situation was, of course, welcomed by those advocates of slow growth or no growth for this country, and unbelievably those people still do not recognize what to most people is obvious – that if industry is forced to apply its available capital to non-productive uses, steadily increasing inflation will be the inevitable result.

Through the growth years, one of the most positive results was the accelerating increase in the standard of life of the average American worker. Our workers were better educated, better informed and have had far more income available for their discretionary use than any other similar group in the world. It was only natural that those increased standards raised their job expectations for better conditions in the manufacturing work place, with the result that there is clear evidence of large-scale boredom, frustration and lack of motivation, particularly among people working on repetitive assembly line-type jobs.

All of these conditions, plus others that I am sure you know of, have resulted in a weakness of the competitive position of this country in the markets of the world and have led to the well-publicized perception that the quality of American products has slipped and is now considered to be substandard compared to the Japanese and perhaps the West Germans.

Now, having said all of this, having painted a pretty dismal picture which is more or less consistent with that recently presented in newspapers, magazines and television programs, I would like to try to put this in a little better perspective.

I said earlier this evening that in the late 1960s the United States had the world's most efficient production capability; we were the world's leading exporter; and we were technologically inventive and innovative. All of these things are still true today and our standard of living is better, but no longer the highest in the world. So as we plan a recovery from our present dilemma, we certainly are not starting from a position of weakness.

U.S. Leads in Research and Technology

As we view with deep concern the high productivity of the Japanese, we should know that their supremacy lies in their ability to develop an effective and efficient production process for relatively simple products. We might admire their manufacturing ingenuity, but remember that much of their supremacy is concentrated on relatively low-technology consumer products, such as watches, cameras, televisions, high-fidelity systems and automobiles. They are beautifully designed and assembled by a highly professional industrial complex, but they are capitalizing to the fullest on someone else's basic research work. The same may be said to a lesser degree about the major advances the Japanese and the Germans are making in their production processes for steel and other metal products. None of these processes are unknown to this country and few of them are the result of Japanese or German development. In a sense, they are doing just what was done in this country in earlier years when our industry capitalized on inventions

and development work done throughout the world.

The American technological leadership still exists. There is no country in the world more capable of successfully designing and developing highly complex technical systems. The most recent of course, was the exciting and stimulating launch and orbital flight and precision landing of the first Shuttle spacecraft. This event filled all of our hearts with pride and gave us a renewed awareness that American technological expertise is still very much alive! It is most important to note that this highly complex system did exactly what it was supposed to do in its very first flight and the Shuttle undoubtedly has the capability to perform economically the myriad of space missions for which it was designed.

There is no other country in the world technically capable of designing and building the Space Shuttle. There is no other country in the Free World capable of designing the MX Missile system or the highly sophisticated Trident submarine ballistic missile weapon system that will soon be operational. And, before you conclude that American scientists and engineers only know how to compete on highly complex and very expensive systems, you should understand that the basic technology on which the world's current electronic systems expansion is based is of American origin. The solid-state transistors, integrated circuits and highly miniaturized electronics that are used so extensively in Japanese calculators, watches and cameras – as well as in micro, mini and mainframe computers – are mainly of American design. Other countries are taking advantage of these developments as they should, but no one else is creating them to the extent that we are.

Most of us are, and should be, impressed by the Japanese use of automated equipment, including the very effective use of programmed robots to carry out complex repetitive operations. Again, it should be recognized that these robots, by and large, are of American invention and development. But the restrictions that America has imposed on itself have prevented the application of this sort of equipment to American industry to anywhere near the same degree.

Good Reason for Optimism

There are still many areas where American products lead the world. Among these are aerospace, agriculture and forest products. Americans continue to innovate, research and invest in their factories, farms and forests with the prospect that our country's leadership in these fields will continue to grow.

There is good reason today for a resurgence of optimism – reason to hope that this great country will regain its industrial momentum! The President has stated his determination to provide incentives for capital formation so that American industry can modernize its plants and equipment and revitalize its production methods and processes.

"We must return to the old ways that made America strong. We must leap ahead by the old techniques of invention, innovation and industrial investment."

There is also a determination to re-evaluate the severe environmental regulations imposed upon industry to make sure that the required standards provide gains commensurate with the adverse impact they are having on the country and that the schedules for their implementation provide a balance between an improved economy and an improved environment.

As our country moves into what is hoped will be a new period of industrial growth, it will not be enough to simply catch up with the Japanese, the Germans and the other competitive people of the world. We must return to the old ways that made America strong. We must leap ahead by the old techniques of invention, innovation and industrial investment. And this will be an exciting period for all practicing scientists and engineers and for all of those who have ever been a part of this process! The present great demand for engineers at all levels of experience is indicative that the process is beginning.

Not only must we engineer the tremendous technological advances – which has always been our basic role – but we must change our processes and methods to insure a greater intellectual participation by the American worker. If we can do this, we can be sure that American productivity and American product quality will once again be the standard of the world.

What the Japanese and West Germans have done to improve productivity involved hard work over a long time.

For the United States, it will take a lot of hard work, also over a long period of time, to correct the damage of the past decade. But if the American people are willing to invest in American industry and if American industry is prepared to invest heavily in itself – there is no question the job will be done.



New Radio. Convair Firefighter Edward C. Perez (left) is instructed in the use of his new radio set by Richard Levy, President of Electrocom, who developed Convair's new radio system.

GD's Electrocom Helps Convair Set Up Its New Radio Network

Convair has modernized its internal radio communications system with the help of Electrocom, Inc., a corporate headquarters organization formed to provide technical assistance to General Dynamics units and to license their radio operations with the Federal Communications Commission.

The former radio communications system at Convair, which served Kearny Mesa and the Lindbergh Field and Air Force Plant 19 complex 12 miles away, was described by Jim Martin, Convair's Telecommunications Manager, as a "hodge-podge" of systems that had built up over the years.

Now, Convair's internal radio communications has been organized by Electrocom around six radio repeaters at Kearny Mesa and Plant 19 that tie together nearly 150 receivers in three different systems.

First, the in-plant paging system can contact 80 pocket pagers which are carried by management personnel.

Second, five mobile radios and 26 portable radios are linked into an Emergency System for ambulance, fire protection and security personnel.

Third, a Shared System has five mobile units and 38 portable radios for vehicle dispatch, production control, and maintenance personnel.

"This entire system was designed and put in place, in-house, because of the skills and technology that were available to us through Electrocom," says Martin. "Electrocom's experience in working with the supplier of the radios, with Federal Communications Commission licensing procedures and in adapting requirements into a system made it possible to install the new equipment and transition to the new system without any down time."

Electrocom is based in St. Louis and operates within the telecommunications organization. Richard E. Levy, Assistant to the Vice President of Operations for Material Service, is the current President of Electrocom. He was selected for this position in 1980 by the Corporate Director of Administration because of his extensive experience in radio communications systems at Material Service. Through Electrocom, Material Service Corp. in Chicago has a system which dispatches 265 concrete mixer trucks through a computer-monitored system over a six-county area.

50th F-16 Built by Netherland's Fokker Delivered to RNLA

The 50th F-16 assembled at Fokker's Schiphol plant near Amsterdam, the Netherlands, was recently delivered to the Royal Netherlands Air Force.

At about the same time, the Dutch firm's Ypenburg facility delivered the 250th center fuselage it has produced under the F-16 multinational program to Fort Worth for final assembly. The fuselage section will be mated into a U.S. Air Force fighter.

Fokker operates one of the two European F-16 assembly lines.

Eisenstadt Named ATC Vice President

Thomas P. Eisenstadt has been appointed Vice President of Sales for American Telecommunications Corp. (ATC).

Eisenstadt has held positions in ATC's sales, market research and product development operations since the company was formed in 1967. His present appointment carries overall responsibility for both domestic and international sales activities, and he will report directly to William B. Porter, President of ATC.

ATC is a subsidiary of General Dynamics that designs, manufactures and markets decorator and character telephones, automatic dialers and telephone answering machines.



Eisenstadt

Pomona Sets Up Quality Circles In Manufacturing Support Areas

Quality Circles, groups of employees who meet to identify and solve work-related problems, are normally associated with manufacturing or production operations.

However, since February, Pomona has established Quality Circles in manufacturing support areas such as Manufacturing Material Control, Quality Assurance and Engineering Support Personnel.

According to a Pomona Quality Circle Facilitator, Jackie Unciano, the success of ideas implemented to solve manufacturing support problems is difficult to measure. In non-production areas, she says, there are few if any measurable standards, "so one way to measure Circle effectiveness is to look for improvements in the way people work together."

Lack of coordination and understanding of other departments' responsibilities can reduce a department's effectiveness, says Maureen Bush, Supervisor for the Pomona Manufactured Parts Section of Operations Data Control Department, who leads a production support Circle.

"Our most important achievement so far," she says, "has been the increased awareness we have developed for each other's job responsibilities - a department operates more effectively when its people understand co-departments' tasks."

Bush says her Circle has made people focus on long-range planning: "Before, we spent too much time putting out fires and not enough time planning. But now, at the Circle meeting, we take one hour each week to discuss our problems and their

long-range, as well as immediate solutions."

One of the first problems Bush's circle tackled was improper information that was supplied on Kit Shortage Notices from manufacturing or assembly departments. These notices are prepared when a part kit has some part or parts missing. Bush's group must enter this information into a computer so the missing part can be located or ordered quickly so production is not held up.

"We often had difficulty with this because people were not recording the correct information on the notice."

"We are updating instructions on how to fill out the notices and explaining to the users why the information must be as complete as possible," she says. "We have just started working on this problem, but we are already seeing results."

Stromberg-Carlson Introduces Comfort Control System

Microwatt, an environmental control system that will help cut energy costs, is now being offered to the hotel/motel market by Stromberg-Carlson Corp.

"Our Microwatt system enables a hotel or motel to program comfort ranges for individual rooms utilizing the in-house telephone system," said James M. Bridges, Acting General Manager of Stromberg-Carlson. "Heating or air conditioning may be directed where needed, and unoccupied rooms may be isolated. And, in the event guests desire room temperatures beyond normal comfort ranges, the front desk can switch any room to manual control."

Holiday Inns located in two different temperature zones are field-testing Microwatt for Stromberg-Carlson. One Inn is near Stromberg-Carlson's Tampa, Fla., headquarters, the other is located in Saginaw, Mich.

"We've noticed savings of about 25 percent in energy usage at our Tampa facility," said Wally Wilcox, regional maintenance manager for Holiday Inn, "and energy savings averaged nearly 12 percent in Saginaw. The Saginaw savings probably would have been greater, but cold weather stayed longer this year and occupancies were down."

The developer of Microwatt, Computer Control Engineering, Inc., of Minneapolis, Minn., granted Stromberg-Carlson an exclusive worldwide license to manufacture and sell the system. It may be installed as a stand-alone unit connected to an existing telephone system or as part of Stromberg-Carlson's Digital Branch Exchange telephone system.

Com Dev Recorder

Com Dev has introduced the STU-4, a compact desktop unit which records up to 8,000 telephone calls. The unit can be used with one or two private automated branch exchanges simultaneously. Com Dev is a subsidiary of General Dynamics Communications Co.

Savings and Stock Investment Values

Salaried	March 1979	March 1980	March 1981
Government Bonds	\$ 2.1294	\$ 2.3372	\$ 2.5835
Diversified Portfolio	1.3704	1.6055	2.1869
Fixed Income	-	1.0719	1.1850
Hourly			
Government Bonds	2.1291	2.3363	2.5811
Diversified Portfolio	1.4018	1.6388	2.2351
GD Stock	\$16.3750*	\$33.5600*	\$33.5000

*Reflects 2 for 1 stock split of November 1980.



Carol Martinez, a senior buyer at Electronics, won a \$1,000 corporate-wide prize for the Outstanding Minority Business Effort of the Year for 1980 for her efforts in placing orders with minority-owned firms. During 1980, General Dynamics placed \$32.2 million in orders with minority-owned firms, a 10.9 percent increase over the \$29 million awarded in 1979.

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G. Alexander Smith

Corporate Earnings Total \$30.8 Million for First Quarter

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Lewis' other comments to the shareholders follow:

"Moving into aerospace, the continued success of the F-16 program highlights GD's government business. As of May 7th, 413 F-16s have been delivered from the production lines at Fort Worth and in Europe to the Air Forces of the United States, Belgium, Denmark, The Netherlands, Norway and Israel.

"Delivery of the 75 F-16s under contract for the Israeli Air Force should be completed this year and Israel has indicated its plans to procure more F-16s, subject to approval by the U.S. Government.

"We will begin delivery of the first of 40 F-16s under contract for Egypt in late 1981, and again we expect that the Egyptian Government will soon order additional aircraft as a key part of their modernization program.

"We continue to be optimistic about sales of this very fine aircraft to additional countries. Late in March, the Administration announced that it had approved the sale of 36 F-16s to the Republic of Korea, and we expect a go-ahead on the Korean contracts later this year.

"The F-16 remains a strong contender in very tough competitions for new fighters in Spain and Australia, and decisions on both of those are expected later this year. Greece and Turkey also continue to show strong interest in the F-16; however, it is difficult to forecast when procurement action might take place.

"We have also been cleared by the U.S. Government to submit operational and cost data to a large number of other countries having a need to modernize their air forces. As we continue to perform on schedule and on budget, we expect the F-16 to gain a steadily increasing competitive edge on its almost universally higher-priced competitors.

"The Fort Worth team assigned to develop the prototype of the advanced F-16XL continues to make good progress, and we expect the first flight of this very high-performance fighter next year. We are confident that the F-16XL, which incorporates new weapon systems technologies and an advanced wing design, will prove to be successful and that it will extend the life of the F-16 program well into the next decade.

"Pomona continues to do well on its many current production and development programs. Phalanx close-in defense systems are now installed on the first eight of 240 U.S. Navy ships scheduled to be equipped with this radar-directed gun. Installation of the first Phalanx on a destroyer of the Japanese Navy has been completed and several other nations have

indicated they plan to arm their ships with this system.

"The Stinger shoulder-fired anti-aircraft missile system was recently qualified as 'operational' by the U.S. Army, and volume production of this system is scheduled for many years ahead.

"In the commercial shipbuilding area, Quincy has been successful in obtaining more new business this year to keep the nucleus of this outstanding shipbuilding team together. Of most importance was a \$61 million contract signed in March with Sun Shipbuilding Company for construction of a roll-on, roll-off, container ship for the Waterman Steamship Company.

"During the first quarter, generally good weather helped our domestic building products and resources operations improve their performance over last year's first quarter. However, the current coal strike is certainly having an impact on sales and earnings at Freeman United Coal Company, and it will for as long as the strike lasts.

ACL Earnings Increase

"Sales and earnings at Asbestos Corporation Limited (ACL) were up significantly, compared to the first quarter of last year when earnings were seriously impacted by what turned out to be a very long strike. Sales forecasts for the rest of this year and for 1982 are somewhat better than the depressed levels of the past and, with their large inventories of processed material, Asbestos Corporation could have very good earnings for the next several years.

"Unfortunately, as things were looking up for the company, prospects for ACL remaining a strong Canadian enterprise in its present form were very much reduced by the Canadian Supreme Court's recent decision that it was constitutional for the Province of Quebec to expropriate the assets of a natural resources company, such as ACL. The Province of Quebec still appears determined to take over control of ACL either by the purchase of General Dynamics' holding of 54.6 percent of ACL stock or by following Provincial expropriation procedures.

"Quebec and our company have agreed to try once again to negotiate a price for General Dynamics' stock in ACL that would be fair to General Dynamics shareholders. We have had two meetings to date, but it is too soon to tell whether this approach, which failed before, will succeed this time. If we do not succeed, Quebec seems determined to go forward to expropriate some or all of ACL's Quebec-based assets. It is impossible at this time to tell just what will happen, but we are determined to do whatever we can that is best for the employees and the shareholders of ACL, as well as for our own shareholders."

Corpus Christi Launched at EB

Continued from Page 1

blaring and crew at attention, slid into the Thames to the strains of "Anchors Aweigh" played by the U.S. Coast Guard Band.

Earlier, Senator Tower, the principal speaker at the ceremony, had said that our nation must be the Number One naval power in the world: "At a time when we're confronted with a powerful adversary whose objectives are incompatible with our own... there's one asymmetry that we cannot accept, and that is that the United States should be anything but the superior naval power of the entire world.

"It is essential," the senator continued, "that we maintain a naval margin. We cannot afford to be second best at sea. And in these restive times, in these times of threat, the Navy is our first line of defense."

In introducing Tower, Navy Secretary John Lehman Jr. called *Corpus Christi* "a splendid ship, a tribute to America's technological know-how and our determination to remain strong at sea."

David S. Lewis, General Dynamics'

Chairman and Chief Executive Officer, remarked before introducing Secretary Lehman, "As you can easily see, there is a tremendous amount of skill, of personal expertise that goes into the construction of these submarines... So we owe a great deal to the people who designed, labored and assisted in some way to give us this marvelous ship."

Lewis congratulated the crew of *Corpus Christi* and stated, "Be assured that you are going first class."

P. Takis Veliotis, General Dynamics' Executive Vice President-Marine and Electric Boat General Manager, welcomed spectators and guests and introduced the dignitaries. Veliotis reiterated that EB would deliver six fast-attack submarines and the *Ohio*, the first Trident submarine, this year "with the support and cooperation of the Navy.

"I cannot emphasize too strongly," he went on, "our determination and our commitment to meeting these goals. It is a commitment we have to ourselves, to the Navy and to the nation. And I am confident we will succeed."

Around the World... ..in GD

CHQ: Ronald W. Craig was promoted to Corporate Director-International Operations.

Fort Worth: L. J. Backof Jr., G. L. Davis, B. E. Kaminski, J. R. Lively and L. C. Spruill were promoted to Manufacturing Technology Supervisor... T. E. Barrett to Quality Assurance Engineering Specialist... E. L. Benson to Inspection General Supervisor... J. C. Berkley to Foreman... S. Y. Brazzell to Technical Group Supervisor... P. F. Brown and B. D. Jackson to Chief of Quality Assurance... J. E. Brozovic, B. P. Mitchell and M. A. Smith to Inspection Supervisor... M. R. Cameron and R. G. Parker to General Foreman... H. C. Card Jr. to Group Engineer... J. V. Davis, G. C. Laughlin, and J. A. Ray Jr. to Field Service Engineer... J. H. George and S. G. Mays to Program Analyst Senior... C. E. Grosskreutz to Project Coordinator... G. A. Jahr to Logistics Administrative Representative... L. A. Kennedy to Industrial Engineer... G. W. Lowe to Financial Analyst Senior... S. L. Manning to Engineering Manager... D. G. Parrent to Quality Assurance Engineer... R. A. Richardson to Flight Test Engineer... T. J. Rickaby to Principal Field Service Engineer... J. E. Saunders to Logistics Supervisor... W. E. Spreen to Material Planning Supervisor... R. J. Zamboni to Assistant Project Engineer.

Convair: John E. Beard, George E. Copeland and James D. Cummings were promoted to Group Engineer... Stephen C. Birmingham to Material Project Coordinator... Charles P. Opp to Project Engineer-Senior... Bertram G. Reitz to Operations Project Administrator... Lawson Spurgeon to Operations Supervisor-Manufacturing... Curtis J. Tanner to Engineering Chief... Luther R. Simpson to Engineering Laboratory Supervisor... Sara J. Garland to Financial Specialist-Senior... Stephen C. Purcell 3d to Contract Specialist... Joseph E. Rogers to Superintendent... Roger R. Rote to Operations General Supervisor-Manufacturing... Forrest R. Smith Jr. to Chief-Operations Program.

Electric Boat: Robert Alling, Neal Madden and Ron Medrzychowski were promoted to Assistant Chief, Nuclear Test Engineering... Eugene Benton, Walter Brehler, Charles Langford and Gregory Watters to Senior Test Operating Engineer... Alan Champagne and James Shields to Test Operations Engineer... Gordon Crosby to Foreman... Robert Dumont, Carl Nicholas and Richard Sears to Chief Test Engineer... John Fichtman to Chief Nuclear Test Engineer... Gary Fuller and Raymond Stanley to Engineering Supervisor... John Larson to Chief of Administration/Control... Richard Lowden to Change Control Supervisor... Paul Marceau, James Grills and Henry Guba to General Foreman... James McGlaufflin and Harold Wissig to Supervisor Quality Assurance... John Taglianetti to Chief of Engineering... Ronald Bozsum to Program Chief... John Card to Trade Planning Supervisor... James Donahue to Supervisor, Contract Evaluation... Robert Gent to Group Trade Planner... Randon Sturm to Chief of Trade Planning... William Tassias to Chief of Contract Evaluation... James White to Chief of Test... D. E. Banke to Salaried Relations Representative Senior... R. K. Carson and G. W. Ihrig to Assistant Project Engineer... R. A. Conner to Technical Publications Editor... T. C. Frascchetti to Project Engineer... A. C. Gebbie and H. H. Hennings to Group Engineer... T. D. Hubbard to Quality Control Engineer Senior... D. L. Gibbs to Publications Technical Specialist... F. H. Montgomery Jr. to Project Administrator... C. W. Rick to Engineering Group Supervisor... A. Velderrain to Manufacturing Supervisor... D. N. Black to Master Scheduler... L. M. Coleman to Cost Control Analyst, Senior... J. J. Hatt to Electronics Engineer Senior... B. T. Jones to Chief, Production Engineering... R. D. Lober to Cost Control Administrator... B. A. Ray to Quality Assurance Specialist... R. D. Rheude to Cost Control Administrator... L. E. Wedblad to Manager, Experimental Factory... Charles Wall to Supervisor Administration/Control... Keith McKay to Shift Superintendent... Charles Chorlton to Test Manager... Stanley Youtt to General Superintendent... Delmore Furnia to Ship Superintendent Senior... Gerard Burkhardt to Manager of Quality.

Quonset Point: Donald Gingerella to Supervisor, Production/Material Control... Charles Hammond to Senior Supervisor, Production/Material Control... Edwin Jump to Chief Nuclear Quality Control Inspection... Donald Deroy and David Poyton to Foreman II... John Tackling to Foreman III.

Pomona: K. D. Bass and A. K. Vieira were promoted to Design Engineer Senior... O. C. Bell, C. K. Brooks Jr., N. A. Clukey, K. R. Miller, G. L. Ownby and D. J. Marks to Procurement Administrator... R. J. Cameli and C. E. Elhai to Chief Supplier Performance Management... R. S. Cessario and C. C. Marquis to Technical Buyer... M. R. Cline to Staff Assistant... A. W. DesPalms, F. L. Noland, L. A. Evans, R. T. Hansen and C. F. Liesenfelt to Purchasing Agent... D. L. Foster to Quality Assurance Specialist Senior... G. L. Hastings and J. P. Sheahan to Senior Buyer... J. A. Hemsath, J. F. Scheible and R. E. Nelson to Manager of Procurement... J. D. Homuth, W. E. Hamilton and J. J. Hazellbach to Packaging Group Engineer... F. M. Keith, S. R. Van Brocklin and M. L. Luckert to Project Representative... W. G. Kormalis to Chief, Material Cost Budgets... R. Perez to Laboratory Group Engineer... D. R. Pillasch and M. R. Collins to Project Coordinator... D. L. Springer to Chief of Inspection.

Electronics: Peter Williamson was promoted to Program Director-Automatic Test Systems.

DSS: L. Whalen was promoted to Computer Systems Analyst at EDSC... G. Bridges to Chief-Data Systems-Quonset Point.

ATC: John Forbes was promoted to Director, Marketing Operations... Eric Geis to Director, Product Planning.

Datagraphix: William E. Corwin was promoted to Supervisor, Field Logistics... Sam Cardoza to Hardware Systems Analyst... Cathryn A. Lee to Product Service Administrator, Senior.

May Deliveries Of F-16s Set Monthly Record

In May, Fort Worth and the two F-16 assembly lines in Europe (in the Netherlands and Belgium) delivered 29 F-16 multimission fighters to the U.S. Air Force and to air forces of five other nations, the largest monthly total in the history of the multinational production program.

As of June 1st, most of the 435 F-16s that had been delivered under the program were on or ahead of schedule – and at target costs established in 1975. The total was 10 or more than had been contracted for through May 1981.

Two other F-16 production milestones were set this spring. One marked the beginning of the second year of delivering F-16s on or ahead of schedule at the Sabca company in Gosselies, Belgium. Aircraft for the Danish and Belgian air forces are assembled at Sabca's plant.

The other was Sabca's delivery of the 300th pair of F-16 wings. D. R. Archibald, Manager of Quality Assurance in the F-16 European Program Office in Brussels, took note of the milestone in a letter to Plant Director J. Detemmerman. In the letter, Archibald said, "The high quality of workmanship evident on these important F-16 components is recognized.

"Please pass on our appreciation to your staff and most certainly to your colleagues in manufacturing who build the quality in while maintaining fabrication and assembly schedules."

F-16s for the Norwegian and Dutch air forces are assembled at the Fokker plant near Amsterdam, and last month Fokker's scheduled deliveries were also on schedule.

Convair Delivers 44-Ton Magnet To Enrich Uranium

General Dynamics delivered a 44-ton superconducting magnet to TRW Space Systems Division that will become the principal component of an isotope separation system for enriching uranium.

This was the first superconducting magnet delivered by Convair Division's Energy Systems Group, and the delivery culminated three years of work including initial study, detail design and fabrication of the magnet. Construction and assembly of the magnet, wound with 13 miles of niobium titanium superconductor and copper, was done at Convair's Harbor Drive Facility.

Dr. Ray Beuligmann, Energy Systems Program Director, said, "This is a major milestone in our efforts to become a recognized leader in energy systems hardware manufacturing. All of those who have been associated with the TRW magnet program deserve credit for an outstanding job."

According to Beuligmann, the TRW Isotope Separation System is one of the three processes that the U.S. Department of Energy (DOE) will evaluate before making a final decision next year on a system that may significantly reduce the cost of producing enriched nuclear fuel. Two laser processes are also under consideration.

If the magnetic separation process is selected by the DOE, the superconductor magnet delivered last month by Convair would be considered a "bantam weight" when compared to actual full-size production hardware. The production-size magnets for the isotope separation process would weigh about 500 tons, span 60 feet in length and 22 feet in diameter. The DOE schedule for production hardware (magnetic or laser) calls for delivery beginning in 1988.

While Convair's TRW magnet system is now being installed and undergoing system tests, the division is continuing with other energy studies and hardware programs for DOE.

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Stinger Inspection. Ken Perry, an inspector in the Stinger Final Assembly area at Pomona's Sycamore Canyon facility, prepares an assembled Stinger weapon for delivery to the U.S. Army.

Stinger Missiles - 5; Targets - 0 In U.S. Army Purchase Testing

Five Stinger missile rounds, picked at random from the Pomona production line, scored direct hits on three subscale high-speed drones and two stationary targets simulating hovering helicopters in April.

The five missiles were launched from a remote control launcher at White Sands Missile Range, N.M. Although Army officials had selected 10 Stingers from the production line for testing, they stopped testing after the five successful flights.

Then in May, under the U.S. Army's "fly-to-buy" program, the entire production lot from which the five missiles were selected was accepted by the Army. The lot includes the required 94 missile rounds specified by the contract and 16 extra missile rounds.

Similar random selection of Stinger missiles from the Pomona production line, followed by tests, will take place every two months under the "fly-to-buy" program.

At a recent employee meeting, General

Dynamics Vice President and Pomona General Manager Ralph E. Hawes congratulated the people involved with Stinger production: "Dedicated team effort is responsible for the product quality and delivery milestones we have achieved," he said.

Acknowledging that there have been some problems along the way in schedule, target costs and production yields, Hawes stressed that "these are areas where we can improve in the future."

The Stinger Weapon System, in production for the U.S. Army and Marine Corps to replace the Redeye System, provides immediate air defense wherever troops have to fight. Stinger is designed so that one person can shoulder-launch the missile to intercept and destroy helicopters and high-speed aircraft.

"Our goal," said Hawes, "is for Stinger to have the performance and reliability record that the Redeye System has had throughout its 15 years in the field."

F-16s Exceed Expectations In European Operational Test

Intensive operational testing in the United States and four European countries has demonstrated that the F-16 fighter "performs outstandingly in air-to-air and air-to-surface roles," the U.S. Air Force announced recently.

The Air Force's Tactical Air Command said that preliminary reports from the 18-month-long F-16 Multinational Operational Test and Evaluation Program (MOT&E) show that its newest combat aircraft "exceeded expectations in both air-to-air and air-to-surface roles." The final MOT&E report is expected this summer.

Six USAF and European air force F-16s and a team of 120 support person-

nel began a six-month deployment to Belgium, Denmark, the Netherlands and Norway in June 1980, "following a year of extensive testing in the U.S.'s western desert ranges," USAF said.

"During the six-month deployment, the aircrews flew more than 700 missions to evaluate the F-16 in point area defense, force protection, air superiority, air intercept, common operations, close air support, interdiction, maritime operations and strike missions. A wide spectrum of air-to-surface ordnance deliveries was also evaluated in the low-ceiling and low-visibility conditions common to the European environment," USAF announced.

The MOT&E team operated for six weeks at each of four European air bases: Leeuwarden Air Base, the Netherlands; Skrydstrup Air Base, Denmark; Beauvechain Air Base, Belgium, and Rygge Air Station, Norway.

The F-16 was chosen by Belgium, Denmark, the Netherlands and Norway in 1975 to supplement their inventories of fighter aircraft. The four nations have agreed to purchase a total of 370 F-16s.

"A memorandum of understanding between the four European countries and the U.S. was signed in 1975 to coproduce the F-16 aircraft," USAF said. "Long-term benefits of the program will be standardization and interoperability of aircraft within NATO, transfer of technology among participants and multinational support for greater operations flexibility."

Material Service Buys Texas Firm

The assets of Bridgeport Aggregates Inc., of Bridgeport, Tex., have been purchased by Material Service Corp.

Material Service will operate the Texas plant under the name of Metroplex Stone Co.

G.R. Nagel, Senior Vice President/Sales for Material Service, has been named President of Metroplex. He will continue to make his headquarters in Chicago.

Gene C. Marter of Material Service will become Vice President and General Manager of Metroplex, and John Halloran of Material Service will be Plant Superintendent. Both will be located at Bridgeport.

USS Jacksonville Commissioned During Ceremony

The USS *Jacksonville* (SSN 699) became Electric Boat's second 688-class fast-attack submarine to join the fleet this year when it was commissioned during ceremonies on May 16th at the Submarine Base in Groton, Conn.

The occasion prompted Representative Charles E. Bennett, Democrat of Florida, Chairman of the House Seapower Subcommittee and principal speaker, to say that the event was part of "a bold new thrust for a stronger national defense..."

Strengthening the national defense, Congressman Bennett told a crowd of several hundred spectators, "is not only a teamwork operation involving the President, Congress and private industry... there is a need for 'Bold Ones' to take the reins of leadership."

Bennett said EB General Manager P. Takis Veliotis qualifies as one of "the bold men who can help us get the nuclear Navy we need, but they can only do it with the dedicated and conscientious work of every man and woman who works in this and other shipyards of the country."

Representing Electric Boat at the ceremonies was Spencer C. Reitz, Deputy General Manager, who said that the *Jacksonville* was the second of three fast attack subs the yard would deliver in the first half of 1981. The third ship, the *Dallas*, "is in the process of completing her sea trials," Reitz said, "and we will deliver her in a few more weeks."

Reitz said EB expects to do "equally well in the second half of the year" and deliver a total of six attack submarines in 1981.

Reitz also remarked on the upcoming sea trials of the first Trident missile sub, the *Ohio*. "*Ohio* is now... just weeks away from beginning her sea trials, and it will be a proud moment when we deliver that ship later this year."

The USS *Bremerton* (SSN 698) was the first fast-attack sub delivered by EB this year. She was commissioned March 28th.

Convair Receives Initial Funding for Shuttle/Centaur

NASA has allocated an initial \$3.4 million to Convair for design and development of two Centaur upper stages for use with the Space Shuttle.

The funding will enable Convair to accelerate work on a wide-body version of the Centaur which will launch the Galileo space craft to Jupiter and International Solar probe from the Shuttle later this decade.

To support the development program, Convair will double the Shuttle/Centaur engineering team over the next four months. About 100 persons are now assigned and that number will increase to about 250 by September.

Earlier this year, NASA announced intentions to integrate Centaur with the Shuttle "to make the very powerful combination available for first launches in 1985." In making the selection NASA said, "no other alternative upper stage is available on a reasonable schedule or with comparable costs."

Current planning calls for Convair to deliver the first wide-body Centaur in 1984. It would be integrated into the Shuttle and launch the Galileo spacecraft to Jupiter the following year. The second wide-body Centaur would fly aboard the Shuttle and send the International Solar Probe on its way in 1986.

Convair's wide-body Centaur is about 28 feet long and a little over 14 feet in diameter. Bill Rector, Convair's Vice President-Space, feels that the Shuttle/Centaur, with its payload capability of 14,000 pounds to geosynchronous orbit, has a very solid future and compares it to the Atlas-Centaur record of performance over the past 20 years.



Two F-16's With the 8th TFW's Distinctive Markings

F-16 'Wolf Pack' Is Gathering At Kunsan AB in South Korea

USAF F-16 fighters now being based at Kunsan Air Base, Republic of Korea, have distinctive markings, block "WP" letters on the vertical tail and a wolf's head on the fuselage.

The markings symbolize the nickname of the 8th Tactical Fighter Wing (TFW), the "Wolf Pack." The first two F-16s assigned to the Korean base arrived in May and will be used for maintenance training. Formal activation of Kunsan as an F-16 base is scheduled for July.

The Fort Worth-built aircraft, newest fighter in the USAF's inventory, will replace the F-4 Phantom which the wing has flown since 1964.

Kunsan is the first overseas F-16 base for the USAF; Hahn AB, West Germany is to be the second. The F-16s arrived in Kunsan as the 8th TFW was celebrating

the 50th anniversary of its founding.

The 8th TFW has a long history in the Pacific. Members of the wing, who were then flying the P-40 Tomahawk, were first sent to the area in 1941, 10 days after the bombing of Pearl Harbor. Nine years later, the wing was initially sent to Korea as the war broke out in that nation.

During the conflict in Vietnam, when the wing was stationed in Thailand, members of the unit found a wolf cub in a jungle near Cambodia, and it became the 8th TFW's mascot.

Maguire Elected General Dynamics Vice President

John P. Maguire has been elected a General Dynamics Vice President by the Board of Directors. Maguire, 64, will continue to serve as Corporate Secretary, a position he has held since 1962.

Maguire first joined General Dynamics in 1954 as Assistant Counsel and served in that position until 1960. From 1960 to 1962, he was Secretary and General Counsel of Texas Butadiene and Chemical International, Ltd.

Prior to joining General Dynamics in 1954, Maguire was associated with the New York law firm of Cravath, Swaine & Moore for 10 years and with Forbes Publishing Co., Inc., as a Vice President and Director.

A native of New Britain, Conn., he received a degree in business administration from Babson Institute in 1936, a Bachelor of Arts from Princeton University's Woodrow Wilson School of Public and International Affairs in 1941 and a doctorate from Yale Law School in 1943.



Maguire

Centaur Upper Stage Receives Award for Voyager Missions

Convair's Centaur high-energy upper stage that sent two Voyager spacecraft to the outer planets has received another NASA award recognizing "outstanding achievement."

Bill Rector, Convair Division Vice President-Space Programs, accepted the Centaur award during ceremonies last month at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif. The citation given for launch vehicle design, development, and launch, said, "In recognition of outstanding achievement through the launch of two Voyager spacecraft, permitting the unprecedented exploration of the Jupiter and Saturn systems and interplanetary space."

In addition to the overall Centaur honor, Chuck Wilson, Convair's Director-Shuttle/Centaur Program, received a NASA Public Service Medal for his "exceptional contributions" to the Voyager missions through planning and managing the implementation of the Centaur stages for the Voyager Titan/Centaur launch vehicles.

H. M. Schuvmeier, NASA's Voyager Project Manager, said, "Voyager's mission to the outer planets set new standards for scientific return from space and for the engineering skills that bring this new knowledge to the world. Everyone who has participated in this great journey of exploration should take special pride in the engineering and scientific accomplishments of the entire team."

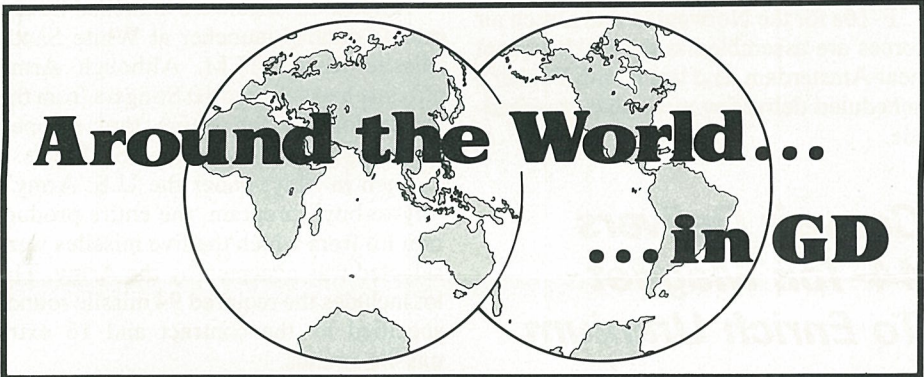
Rector pointed out that these awards are the latest kudos given Centaur and Voyager. In March, the entire Voyager Mission Team was selected winner of the 1980 Robert J. Collier Trophy for the space missions to the outer planets that collected basic new information about the Solar System. Also in March, the NASA/Industry Centaur Team, led by NASA's Lewis Research Center and Convair Division received the National Space Club's Nelson P. Jackson Aerospace Award.

System Century Wins Unconditional REA Acceptance

The System Century Digital Central Office (DCO) equipment manufactured and serviced by Stromberg-Carlson is the first to receive unconditional acceptance by the Rural Electrification Administration (REA).

REA is a Federal agency which provides funds and other assistance to independent telephone companies. To receive REA acceptance, equipment must undergo extensive field evaluations and meet or exceed the requirements of REA's technical specification for DCO's.

REA earlier granted acceptance to Stromberg-Carlson's standard desk and wall rotary telephones, desk and wall Tone-Dial telephones, and designer type Mini-Wall telephones.



CHQ: Barbara G. Plattner was promoted to Corporate Office Supervisor - Word Processing/Text Processing... Michael L. Doyle to Corporate Manager Property Insurance... Edward D. Williams joined as Corporate Senior Writer.

Fort Worth: W. B. Anderson Jr., C. A. Hardy and J. C. Mathews were promoted to Engineering Manager... C. K. Brockman to Program Specialist... R. B. Cameron, P. L. Currier and C. A. Eaks Jr. to Group Engineer... H. L. Chase to Financial Specialist... A. W. Crocheteire to Traffic Foreman... J. V. Dean to Material Project Administrator Senior... J. V. Dupree to Logistics Engineer... H. E. Funderburk and F. I. Rutherford to Field Service Engineer... H. Gonzales to Inspection Supervisor... R. L. Havens to Material Cost Coordinator... D. C. Henry to Manager of Contracts Administration... W. H. Jones to Industrial Relations Administrator... T. Kersey to Night Manager at Abilene... G. W. Lancaster and C. A. Rice to Project Coordinator... B. W. Martin to Logistics General Supervisor... J. Martinez to Industrial Engineer... J. M. Navaira and J. E. Pyle to Quality Assurance Field Engineer Senior... G. Voyles to Manager of Management Relations... R. K. Thompson to Project Engineer.

Pomona: A. J. Beauvais was promoted to Project Administrator... F. M. Bishop to Material Liaison Representative... J. R. Hauge to Design Specialist... N. Jarvis to Quality Assurance Specialist... H. E. Kaiser to Manufacturing Development Specialist... R. D. Kleinsorge to Manufacturing Supervisor... T. M. Leonard to Group Engineer... H. G. Molina to Design Engineer Senior... R. M. Rougeau to Procurement Administrator... R. A. Baker to Engineering Specialist... G. Bales to Laboratory Group Engineer... C. A. Banke to Training Specialist... H. B. Boland to Manufacturing Group Engineer... K. J. Doerner to Superintendent... C. W. Hicks to Assistant Project Engineer... R. C. Kidd to Project Engineer... J. L. Miller to Project Representative.

Datagraphix: Dennis Griffin was promoted to Manager, Production and Industrial Engineering... John T. Kent to National Sales Manager... Richard A. Malsbary to Sales Manager - Printer Products... William A. Nichols to District Sales Manager.

Convair: Robert L. Eidson was promoted to Engineering Chief... Fredrick R. Ketley to Chief, Numerical Control Systems... Warren H. Merrill to Group Engineer... Clarence E. Miller to Plant Protection Officer... Dennis E. Moore to Operations Supervisor... Howard H. Dickey to Manufacturing Operations General Supervisor.

Electronics: Willard Cushman was promoted to Manager of Security... Richard Sorcinelli to Material Control Supervisor.

DSS: R. J. Foley was promoted to Chief, Computer Aided Manufacturing at WDSC... J. Johnson to Senior Production Control Analyst - EDSC.

Electric Boat: Michael Barney was promoted to Chief of Production/Material Control... Dean Greber to Chief of Traffic and Transportation... Richard Balogh, Irwin Pierce and Wayne Gates to Ship Superintendent... Henry Giulian to Assistant Chief Test Engineer... John Lopes to Senior Supervisor, Timekeeping... James Macaulay to Engineering Supervisor... James McNish to Supervisor of Quality Assurance... William Sanborn to Senior Supervisor, Educational Services... George Lansperger to Program Analyst Senior... Lee James to Engineering Specialist... Alfred Malchiodi to Manager of Engineering.

F-16 Fighting Falcon Ad Reproduced For GD Employees

At GD World press time, the F-16 multimission fighter was making its fourth consecutive appearance at a Paris Air Show. A new ad featuring the Fighting Falcon (reproduced on Page 4 suitable for framing) is appearing in some 15 U.S. and international publications being distributed at Le Bourget, site of the show.

The ad was produced by the Knott & Meads agency in San Diego and was developed from a photograph of "Kittyhawk," one of a dozen falcons used to support the United States Air Force Academy's athletic program.

Corporate Photographer Tom Rule caught the female Prairie Falcon in his lens during a training session conducted by academy cadets who regularly handle the birds during their half-time performances at football games.

Savings And Stock Investment Values

Salaried	1979	1980	1981
Government Bonds	\$ 2.1457	\$ 1.4067	\$ 2.5671
Diversified Portfolio	1.3844	1.6709	2.1570
Fixed Income	—	1.0799	1.1954
Hourly			
Government Bonds	2.1455	2.4047	2.5647
Diversified Portfolio	1.4162	1.7044	2.2049
GD Stock	\$15.5000*	\$33.8750*	\$34.0000

* Reflects 2 for 1 stock split of November 1980.

Vivien Steger Honored by YWCA For Professional Achievements

Vivien Y. Steger, a Convair Senior Research Engineer, was honored by the San Diego Young Women's Christian Association (YWCA) during its Second Annual Tribute To Women and Industry (TWIN).

Steger, who has been with Convair since 1977, has primary responsibility for selection, testing and application of adhesives and sealants for all of Convair's major products. She also performs evaluation and failure analysis on composites and honeycomb thermal insulation panels as well as coatings for electrical insulation.

The TWIN awards honor women who have made a significant contribution as managers, executives and professionals, and recognizes those firms whose personnel policies have helped make such achievements possible. The awards are also aimed at encouraging women to consider and prepare for a wide range of career opportunities in business and industry.

Steger was graduated from the University of Michigan with a degree in chemistry and received a master's degree from St. Louis University in 1974. Prior to joining General Dynamics, she worked for Xerox and McDonnell Douglas.

According to Carl W. Smith, Engineering Chief of the Organics and Composites

Department, Steger is one of Convair's key engineers in the fields of sealants, adhesives and surface preparation. She is known in the aerospace industry for her work in structural bonding using high temperature polyimide adhesives. Steger presented a paper last year at the National Society for the Advancement of Materials and Processes Engineering symposium covering her work in a company and NASA-sponsored research program, "Composites for Advanced Space and Transport Systems."

Convair Division received special recognition and a TWIN Corporate Award for providing programs and opportunities that support women and their career aspirations.

Four Appointed To Convair Posts

Four appointments to staff positions have been announced within the Convair Operations functions: G. M. Esslinger, formerly Director - Manufacturing Engineering, has been appointed Director - Fabrication; Z. H. Hyman was promoted to Director - Manufacturing Engineering, replacing Esslinger, and D. W. Cormany has been promoted to Director - Manufacturing Control, replacing Frank Robins who is on special assignment.

Esslinger, Hyman and Cormany will report to Ed Squires, Convair's Vice President - Production.

In a related appointment, J. M. Kenna has been promoted to Director of Industrial Engineering and Scheduling, reporting to Sid Wilkinson, Vice President and Deputy General Manager - Operations.

U.S. Navy Awards ASW Contract To DatagraphiX

DatagraphiX has received a \$7.4 million follow-on contract from the U.S. Navy for continued production of tactical antisubmarine warfare (ASW) display systems.

DatagraphiX has been providing the airborne displays to the Navy since 1969 for use aboard P-3 Orion patrol aircraft. Designated the AN/ASA-70 Tactical Display Group, the displays form an integral part of the total ASW system patrol aircraft.

Each ship-set built and assembled by DatagraphiX is comprised of two 16-inch multi-purpose displays, two seven-inch auxiliary readout displays and associated power supplies. The four displays use the proven Charactron® Shaped Beam Tube to display the tactical ASW data and situation information for translation by the aircraft crew.

DatagraphiX has delivered more than 200 ship-sets to the Navy.

Convair Awards Material Contract To Minority Firm

Convair has signed its largest subcontract so far with a minority-owned firm. The \$1.3 million award is with Supercon, Inc. of Natick, Mass., for fabrication of solenoid magnet superconducting material.

The material will be used by Convair in producing magnets for the Mirror Fusion Test Facility (MFTF-B) at the Lawrence Livermore National Laboratory.

Supercon is a leading manufacturer of superconducting materials and has supplied materials for several of the successful large superconducting magnets built in the United States. Superconducting materials transmit electricity with little energy loss when maintained at extremely low temperatures.

The President of Supercon is Dr. James Wong, who has served with the Materials Advisory Board of the National Academy of Science. His firm was competitively selected by Convair as a result of evaluation of cost, schedule, technology, quality assurance, responsiveness and management capability. The Procurement Review Team was headed by R. E. Tatrow, MFTF-B Program Manager, and Mel Byrd, Procurement.

Two Convair Suggestors Win Large Cash Awards for Their Ideas

Two Convair employees have been awarded substantial cash awards for their suggestions. D. H. Holzer, a Senior Test Engineer in the Engineering Test Lab, received \$3,487 for his suggestion to change the procedures followed when cruise missile pneumatic umbilical assemblies are rebuilt. R. G. Helm, a DC-10 Subcontract Representative based at McDonnell Douglas' Long Beach plant, received \$2,872 for suggesting new methods of expediting parts needed for DC-10 fabrication and assembly.

Holzer's suggestion pointed out that the departments rebuilding cruise missile

umbilical assemblies that had been used in a launch did not have the necessary equipment to test the rebuilt assemblies while they were being worked on. As a result, the assemblies often had to move from department to department for test and back for further work.

The movement between departments caused a considerable amount of paperwork which Holzer suggested could be eliminated if the rework were done by the Engineering Test Lab and the Engineering Test Support departments where the test equipment was located. His suggestion eliminated more than 2,000 manhours of processing time per year and resulted in a savings of nearly \$35,000.

Helm suggested that certain critical parts needed for DC-10 fabrication at Long Beach be borrowed from McDonnell Douglas rather than allow production of fuselage sections to be delayed while rush purchase orders were submitted.



Robert H. Widmer

Always Look Toward the Future

By Edward Williams

Robert H. Widmer, in his 42 years with General Dynamics, has seen the company grow from designing and building flying boats to supersonic jets and cruise missiles. His experience has taught him to "always understand the present together with a vision of the future."

Widmer retired May 31st as Vice President-Science and Engineering at the Corporate Office, a position he had held since June 1974. He will remain associated with the company for a period of time and will also have time for an important interest — applying technology to energy problems.

During a recent interview, Widmer emphasized his personal philosophy for both endeavors by saying, "We must always look toward the future and anticipate what the country and the world needs."

Widmer was a 23-year-old aeronautical engineer when he joined Consolidated Aircraft Corp. as a detail draftsman in San Diego in 1939. Three years later he transferred to Fort Worth and became head of Aerodynamics, Thermodynamics and Propulsion.

In his career at Fort Worth, which spanned 31 years, he moved up to Chief Engineer in 1959 and Vice President of Research and Engineering in 1961. In 1971, that position was expanded to include Convair in San Diego as well as the Fort Worth operation.

Widmer looked back temporarily and said, "I guess you could say I helped to build the Fort Worth Division from the ground up. The government had built the plant in a hurry for B-24 production, and I was sent there with the promise that I would be brought back to San Diego in a few years."

"I was sent to Fort Worth with only two other young engineers whom I was allowed to pick myself, and that was the entire technical design staff. At its peak, years later, Fort Worth had about 4,000 engineers," Widmer added.

At San Diego, Widmer's engineering experience included work on the PBY and PB2Y flying boats, and at Fort Worth he had technical responsibility for the B-24, the B-32 and the B-36. In later years, this grew to include the B-58, the F-111 fighter-bomber, and the conceptual development of the F-16 multinational fighter and Convair's Tomahawk cruise missile.

Although reluctant to single out any project which gave him the most professional satisfaction, Widmer said that the B-36 was the most exciting "because it occurred early in my career and represented the cornerstone of the Air Force as a newly-created military service after World War II." The B-58, he said, was probably the most dramatic and technically challenging.

"The B-36 enabled the Air Force to hold on to its world strategic mission and not give it up to the Navy," Widmer said. "It could fly globally and eliminated the island-hopping of World War II B-24s, B-17s and B-29s."

Widmer added that, although the B-36 cruised at an indicated air speed of only 220 miles per hour, it could do it at an

altitude of 50,000 feet and for a range of 10,000 miles. "The original jet fighters at that time could not reach or maneuver with it at that altitude and the B-36, therefore, turned out to be a jewel and the foundation of today's Strategic Air Command."

The B-58 was a most challenging program, he said, because for the first time an aircraft company was given a total weapons systems integration contract "where we were responsible for everything."

"We had to go from the B-36, a 220-mile-an-hour lumberbus to a Mach 2 airplane, with powered controls, designing every piece of electronics and avionics as well as the airplane," Widmer said. "We changed from a B-36 riveting masterpiece to a B-58 with no rivets at all. The B-58 had aluminum bonded honeycomb and stainless steel braised skin panels bolted to an aluminum substructure."

Because of the complex nature of the B-58 project, "we became the first in industry to use IBM punched card computers to do extensive technical work," Widmer said.

Widmer's interest in aviation goes back to 1927 in Hawthorne, N.J., when, at the age of 11, "I got excited" listening on a crystal radio set to the progress of Charles Lindbergh's New York to Paris flight. "My father, a doctor of chemistry, thought flying was a stupid sport," Widmer said, "but I always was a rebel, so I hung around grass airfields helping out, just to be near the planes."

Widmer said he started out at Rensselaer Polytechnic Institute (RPI) as a chemical engineer — as was his father's wish — but switched to aeronautical engineering in his sophomore year without his father's knowledge. "He never found out until my graduation day in 1938, and by then it was much too late."

Widmer and a flying mechanic at Teterboro Airport had built a small biplane of their own design while he was at RPI, and Widmer's partner flew it in the old Miami Air Races. The success in building, wind tunnel testing and flying the tiny plane was the subject of Widmer's thesis and also was instrumental in getting him a graduate fellowship to the California Institute of Technology, from where he received a master's degree in aeronautical engineering in 1939. It also helped him get a job with the Consolidated Aircraft Company in San Diego.

Now that he is retired, Widmer expects to spend more time with his wife, Jeanette, and two grown children, Larry and Mrs. Gail Landreth.

But Widmer, an admitted "dedicated worker," plans to still devote time to the application of engineering technology to today's and future problems and remain active in the professional organizations of which he is a member. He also is a consultant to a number of science and technology groups.

As for his continued association with General Dynamics, "we are looking ahead with our F-16XL and cruise and defensive missile derivatives in keeping our foot in the door of the future as we have in the past," he said.

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The F-16

The unleashed fury
of the Fighting Falcon



The F-16 Fighting Falcon

Hill AFB F-16s Win Bombing Contest Held in Scotland

A team of seven F-16 Fighting Falcons and their air and ground crews from Hill AFB, Utah, recently won a joint Royal Air Force-U.S. Air Force bombing competition held at RAF Lossiemouth, Scotland.

The USAF pilots and support personnel from the 388th Tactical Fighter Wing (TFW) at Hill amassed a total of 7,831 out of a possible 8,000 points in the first international bombing competition for the F-16. The second place finisher, a British team flying Jaguars, scored 1,076 points less.

During the four-day competition which ended June 19th, the F-16s flew simulated combat missions which included bombing simulated targets and countering interceptor aircraft.

"The F-16 is a very capable aircraft," said USAF Capt. Roger Riggs, leader of the F-16 team and winner of the contest's Hunting Tactical Weapons Trophy. He was named "Top Bomber" for his perfect score.

"With the radar and head-up display, we could get the first tally-ho (on an intercepting aircraft), and that's what counts," Riggs said. "We got off the first shots on target, and could go on to the bombing mission."

During the competition, Riggs said, "we could put the bombs exactly where we wanted them - it's an impressive weapon system."

"One of the most significant things about the competition was that we were loaded for air-to-ground missions, yet we could still compete and win against air-to-air interceptors," said USAF Capt. Wayne Edwards, who was runner-up for the top individual prize in the competition. "Quite simply, we could outmaneuver (the interceptors), shoot them down and go on and drop our bombs and get back home."

In the bombing sorties, the 388th TFW crews demonstrated precision accuracy of the F-16 system by delivering all ordnance on assigned targets, a simulated airfield and vehicle convoys. The F-16s were the only aircraft in the competition to hit all targets in two days of bombing strikes against the convoys.

In winning the individual honors, Riggs had to tell the competition's judges which convoy vehicles he would hit and also say exactly where his bombs would land on the airfield - in the four days of competition, he did not miss any of his targets.

The F-16s competed against Royal Air Force (RAF) Jaguars from Cotishall, England and Bruggen, West Germany, an RAF Buccaneer team from Honington, England, and a U.S. Air Force team flying F-111s based at RAF Lakenheath, England.

The air-to-air threats, RAF F-4s and Lightnings, put constant pressure on the competing aircraft from five minutes after

Continued on Page 4

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Flying High. An F-16 Fighting Falcon piloted by Neil R. Anderson, Fort Worth Director of International Flight Evaluation and Engineering, ascends in a steep climb over Le Bourget airport, scene of the 1981 Paris Air Show. This dramatic photo was made by Anderson with a motor-driven camera and extreme wide-angle lens mounted by Time Magazine Photographer Mark Meyer. (Additional Photos on Page 4)

Adams Executive VP-Aerospace; Rogers Named to Head Fort Worth

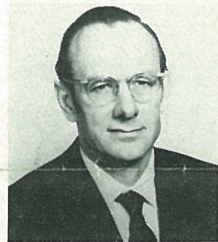
Two senior General Dynamics executives will take on important new assignments within the company.

Richard E. Adams, Vice President and General Manager of Fort Worth for the past 10 years, has been named Executive Vice President-Aerospace, succeeding James M. Beggs, who has been appointed Administrator of the National Aeronautics and Space Administration. Herbert F. Rogers, Vice President and Deputy General Manager of Fort Worth since 1977, will succeed Adams as Vice President and General Manager of the division.

Adams will transfer to St. Louis and have responsibility for the company's Convair, Electronics, Fort Worth and Pomona divisions, as well as General Dynamics Services Co. He will report to David S. Lewis, Chairman of the Board and Chief Executive Officer, and Oliver C. Boileau, President.

A native of Springfield, Ohio, Adams was graduated from Purdue University in 1942 with a Bachelor of Science degree in Mechanical Engineering. He joined General Dynamics at Fort Worth in 1951 as an assistant project engineer and held a number of increasingly responsible engineering and design positions at the division. In 1970, he was named Vice President of Engineering at Convair.

He was appointed Vice President and General Manager of Fort Worth in April 1971 and was named a Corporate Vice President in August 1974.



Adams



Rogers

Rogers, a native of Pullman, Wash., was graduated from Purdue University in 1949 with a Bachelor of Science degree in Aeronautical Engineering. He has been associated with General Dynamics since 1949 and has held a number of key engineering and program management positions with both the Fort Worth and Convair divisions.

He was appointed Vice President-Marketing for Fort Worth in 1974 and was named Program Director for the F-16 fighter in early 1976. He was promoted to Vice President and Deputy Division General Manager in 1977 with continuing responsibility for the F-16 production program. His most recent assignment was Vice President-F-16 International Programs.

New Era Opens As Ohio Begins Her Sea Trials

The U.S. Navy's first Trident submarine, the *Ohio*, returned to the Groton shipyard on July 6th after successfully completing her second set of sea trials during which she was at sea two weeks. *Ohio* is on schedule for delivery to the Navy in October. It is planned that she will undergo a total of four sets of sea trials before delivery. The following story by Staff Writer Jim Reyburn describes *Ohio's* departure for her first set of sea trials on June 17th.

Dawn on June 17th was more than just routine. It ushered in a new era.

For with that dawn, the U.S. Navy's first Trident missile submarine, *Ohio*, lead ship in a class that will become the nation's first line of defense into the 21st century, began backing away from her berth at Electric Boat. Mission: initial sea trials.

Not since the EB-built *Nautilus*, the world's first nuclear-powered ship, went to sea in 1955 had a sea trial created quite such a stir.

Several hundred employees (some had been waiting for hours) looked on as two huge tugs eased the 560-foot, 18,750-ton ship from the north wing wall on Graving dock No. Two. Three more tugs hovered nearby.

Then, the tugs stood off. *Ohio* sat poised for her trip down the Thames River and out into the Atlantic. It was 4:55 a.m.

Moments later, a telltale, almost imperceptible wake began to stir at *Ohio's* stern. "She's on her way," someone on the dock said as *Ohio* began to press forward into the haze.

"Good Lord, she's huge," said another onlooker.

Ohio began sliding down the Thames for the five-mile run to the Atlantic. Crowds of early rising spectators lining beaches and roads on both sides of the river broke into applause as *Ohio*, awesome and impressive, glided majestically past.

At 5:28 a.m., an armada of small boats in attendance, the big sub came abreast of New London Ledge Light at the mouth of the river and moved on toward The Race, the eastern end of Long Island Sound.

Ohio picked up speed, pushing white water around her bow. "She's really beginning to move now," said one photographer, asking the skipper on his chartered boat to ease the throttle forward to keep pace. "There's something about her," said another person. "She looks like she could outrun all of us if she wanted to."

Like something out of a Jules Verne novel, *Ohio* plowed on toward The Race, the spectator fleet hugging her flanks.

6:20 a.m. *Ohio* was a mile off The Race, the point where most spectator boats would turn back.

6:30 a.m. Race Rock Light loomed out of the thickening haze 200 yards to port. The spectator fleet started dispersing.

6:34 a.m. Most of the fleet had waved its goodbyes and had turned reluctantly for home. *Ohio*, now accompanied by a Navy escort vessel that seemed to appear from nowhere, vanished into the haze.

Ohio was at sea.

Then, three days later, she was back at Groton.

"Great job! Heard it went really well," shouted onlookers to the line of EB and Navy personnel streaming off the gangway onto the dock on June 20th.

Among the first people off the ship was Electric Boat Deputy General Manager Spencer Reitz, who was senior company official aboard for the trials. "It is a great boat," Reitz said. "Trials were run very smoothly, without serious incident and . . . very, very successfully." Reitz also said that EB should be "very proud of its people."



Top Bombers. Pilots and ground crews of the U.S. Air Force F-16 bombing competition team pose before three of the seven Fort Worth-built Fighting Falcons used in the joint Royal Air

Force-U.S. Air Force meet held recently at RAF Lossiemouth, Scotland. The team, from the 388th Tactical Fighter Wing, won the first international competition for the F-16.

Dr. Alan M. Lovelace to Direct GD Science and Engineering Effort

Dr. Alan M. Lovelace, Acting Administrator of NASA for the past six months, has joined General Dynamics as Vice President-Science and Engineering. Lovelace succeeds Robert H. Widmer, who retired in May after 42 years of service.

Lovelace, 51, will be responsible for directing and coordinating the company's engineering, research, advanced product and program development and for developing and implementing corporate engineering and research policy.

Lovelace joined NASA in 1974 as Associate Administrator for the Office of Aeronautics and Space Technology and was appointed Deputy Administrator of NASA in 1976. He became Acting Administrator in January 1981.

A native of St. Petersburg, Fla., he received a Bachelor of Science degree in Chemistry in 1951 from the University of Florida and a Master of Science in 1952 and a Doctorate of Philosophy in 1954, both in Organic Chemistry, from the same university.

After two years of military service with the U.S. Air Force, he continued to work as a civilian at the Air Force Materials Laboratory, Wright-Patterson AFB, Ohio, where he was named Chief Scientist in 1964 and Director in 1967.

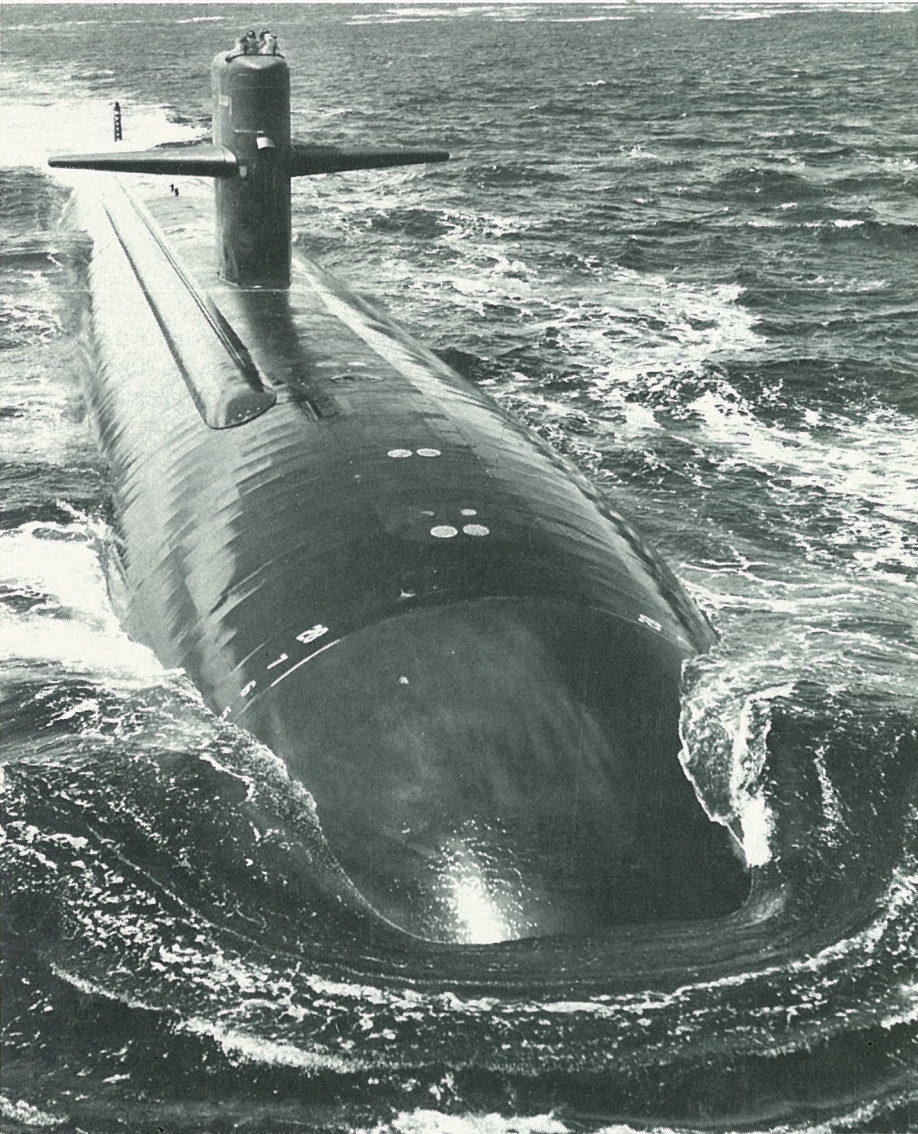
In 1972, Lovelace was named Director of Science and Technology for the Air



Lovelace

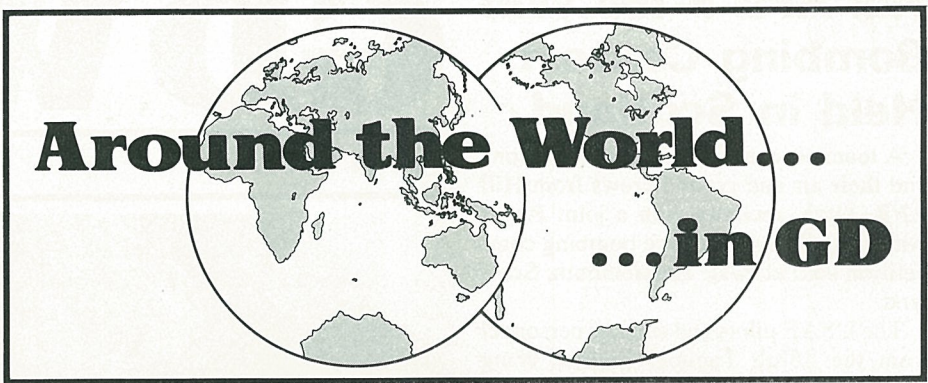
Force Systems Command, Andrews AFB, Md., and later became the principal deputy to the Assistant Secretary of the Air Force for Research and Development, a post he held until joining NASA.

He is a Fellow of the American Institute of Aeronautics and Astronautics and the American Astronautical Society and is a member of the National Academy of Engineering, the Air Force Association, Sigma Xi and Phi Beta Kappa.



The Third. On June 26th Dallas (SSN 700) became the third EB-built 688-class fast attack submarine delivered to the U.S. Navy this year. The 360-foot, 6,900-ton sub, EB's eighth of the class, was scheduled for commissioning on July 18th. Still to be delivered in 1981 by EB: three of Dallas' sister ships - LaJolla, Phoenix and Boston - and Ohio, the first Trident missile submarine.

<i>Savings and Stock Investment Values</i>				
Salaried	May 1979	May 1980	May 1981	
Government Bonds	\$ 2.1637	\$ 2.4587	\$ 2.6052	
Diversified Portfolio	1.3689	1.7581	2.1840	
Fixed Income	—	1.0889	1.2058	
Hourly				
Government Bonds	2.1638	2.4564	2.6026	
Diversified Portfolio	1.4004	1.7932	2.2316	
GD Stock	\$14.4350*	\$31.6250*	\$32.0000	
*Reflects 2 for 1 stock split of November 1980.				



CHQ: Donald G. Norman was promoted to Corporate Director of Personnel Planning and Placement... Sherwood L. Lambert 3d to Senior EDP Auditor.

Convair: David W. Cormany was promoted to Director - Manufacturing Control... Z. Henry Hyman to Director - Manufacturing Engineering... John M. Kenna to Director - Industrial Engineering & Scheduling... John S. Miller to Engineering Chief... R. F. Schweitzer to Manager - Manufacturing Engineering... Stephen R. Woolley to Employee Services Supervisor... J. F. Dean to Launch Operations Group Supervisor - Base... John T. Fassel to Project Engineer... Shirley A. Langford to Operations Supervisor - Communications Services... Darrell E. Parsons to Manager - Scheduling... Norm Pearl to Manager of Industrial Engineering... D. S. Stone to Manager, Procurement... Nicholas L. Valentino to Operations Supervisor - Manufacturing... Clarence Stover to Manager, Facilities Planning.

Fort Worth: T. M. Archer was promoted to Chief - Material Control... M. D. Bates to Technical Group Supervisor... J. E. Brunette and T. W. Haydon Jr., to General Foreman... E. L. Burkhard to Logistics Group Engineer... J. D. Chambers and J. C. Holder to Production Specialist... G. Donatham Jr. to Engineering Administrative Specialist... K. B. Elliston Sr. and J. D. Hawkins to Inspection Supervisor... M. M. Lauderdale 3d to Industrial Engineer Sr... R. A. Pickett to Project Coordinator... R. O. Roberts to Quality Assurance Engineering Specialist... J. D. Slack to Chief of Logistics... G. C. Stone to Manufacturing Technology Supervisor... D. L. Varner to Logistical Control Supervisor... J. C. Pope to Project Tool Engineer.

Quincy Shipbuilding: Donald Smith was promoted to Industrial Hygienist Supervisor... Russell Billard to General Superintendent - Loft... George Williams to Superintendent of Maintenance... Carroll Richards to Chief, Guarantee Engineering... Edward Paccioretti to Senior Material Analyst.

Pomona: R. D. Austin and M. J. Coffield were promoted to Project Representative... M. E. Baumgardner to Product Line Manager... M. L. Cox, F. N. El Assaad, K. J. Sance, L. G. Sims Jr. and D. J. Johnson to Quality Assurance Specialist... R. D'Errico to Project Administrator... M. R. Pavlovich to Manufacturing Engineer... C. N. Arendt, B. M. Mulligan, W. H. Pansing and S. M. Albright to Group Engineering... M. J. Wendruck to Project Engineer... J. R. Barnes to Assistant Project Engineer... J. B. Grissinger to Medical Services Supervisor... D. L. Heffron to Assistant Project Engineer... G. R. Olsen to Superintendent... E. E. Parsonage to Laboratory Group Engineer... R. M. Pottorff and H. K. Whitelock to Electronics Engineer Sr... F. A. Roccatani to Manager of Production Support... E. M. Yazzie to Inspection Supervisor... D. Thompson to Test Engineer Navajo.

Electronics: Willard Cushman was promoted to Manager of Security... Richard Sorcinelli to Material Control Supervisor... Robert D. Bowen to Engineering Specialist I... Dorothy M. Johnson to Technical Supervisor... Kenneth Ponchetti and William W. York to Production Test Engineering Specialist.

Electric Boat: William Souza was promoted to Foreman... Antonio Almeida, Austin Alvarez, John Reid and Michael Schoenborn to Engineering Supervisor... John Baker to Nuclear Ship Superintendent... Alan Bayreuther to Manager of Engineering... Oramel Carr and John Sweeney to Senior Ship Superintendent... David French to Group Trade Planner... Edward Gaffney to Supervisor, Design Services... Charles Haddad to Design Chief... Walter Kohn to Dock Engineering Supervisor, Sr... Donald Parker to Chief of Engineering... Paul Pouch to Ship Superintendent... Louis Vescovi and David Hantman to Trade Planning Supervisor... James McCormack to General Foreman... John Randall to Chief of Planning... Kenneth Hamler to Design Supervisor - Material.

Datagraphix: William C. Kowaleski was promoted to Regional Systems Specialist... Roger Lamberson to Manager, Reader Products... Merle McLaughlin to Supervisor, Engineering Preproduction... Lester C. Norton to Manager, Marketing Software Support... A. Ron Evangelista to Regional Sales Manager... Jess R. Knighton and Jim M. Mayfield to Supervisor, Technical Support... Dave B. Furbish and Larry G. Robinson to District Service Manager... Dennis Griffin to Manager, Production and Industrial Engineering... William A. Nichols to District Sales Manager.

ATC: Brian Esselbach was promoted to Product Manager... Tom Gray to Project Manager.

F-16/79 Export Fighter Completed 131 Test and Evaluation Missions

The Fort Worth F-16/79 intermediate export fighter has flown 122 hours on 131 test and evaluation missions.

Pilots from three foreign air forces have flown F-16/79 evaluation flights since the aircraft completed its development flight test program in January.

The aircraft also has been flown by U.S. Air Force and U.S. Navy pilots. A total of 28 pilots has flown the fighter.

The F-16/79 development flight test program determined that the handling qualities of this aircraft, equipped with a General Electric J79-GE-119 turbojet engine, are similar to those of the standard F-16 which is powered by a Pratt & Whitney F100 turbofan engine.

The J79 engine is in the 18,000-pound-

thrust class, while the F100 engine produces approximately 25,000 pounds of thrust.

The F-16/79 prototype has reached an altitude of 50,000 feet, demonstrated maximum airspeeds in excess of Mach 2 and routinely carried out nine "g" maneuvers during simulated combat flying.

Dividends Declared

The General Dynamics Board of Directors has declared a regular quarterly dividend of 18 cents per share on the company's common stock and \$1.0625 on its Series A preferred stock, payable to shareholders of record on July 17, 1981.

The dividend on the common stock will be payable on August 17th and the dividend on the preferred will be payable on August 14th.

Information Center at Electronics Keeps Track of AIS Station Status

If you were to ask Electronics' Gerry Schmidt about any of the 88 F-16 Avionics Intermediate Shop (AIS) stations that currently support F-16 fighters worldwide, he could give you its current status as well as its service history.

Schmidt wouldn't do this from a phenomenal memory; rather, the room he occupies at Electronics Division in San Diego is lined with wallboard displays that contain the current status of every AIS station in the world, color coded to show at a glance whether that station is up, limited in capability, down or off-line for programmed maintenance.

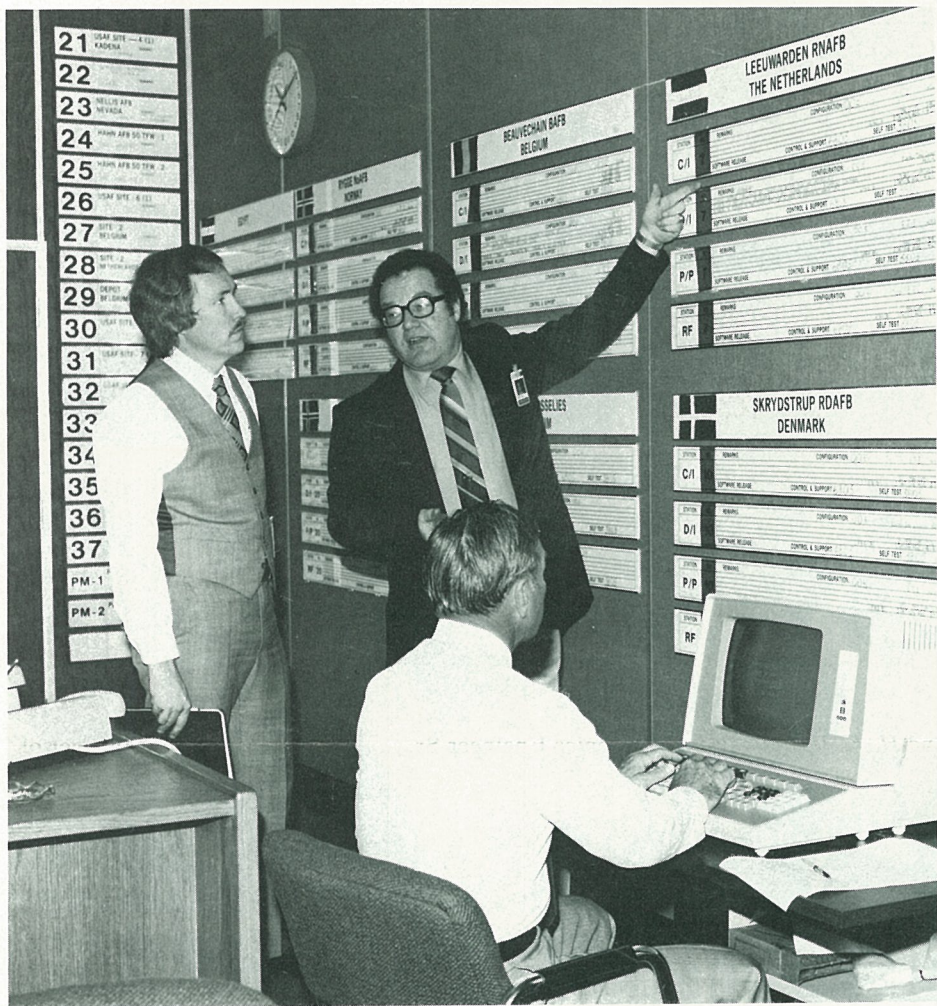
Every day, reports come to this Management Information Center from F-16 bases and maintenance facilities around the world, are posted to the display boards by Jan Pfleeger and entered into a com-

puter data base that can give the history of any unit at any time.

Schmidt says that the historical part of this data base can be one of the most important parts of the center. Through it, Electronics engineers and managers can keep track of each station's activity, and watch for trends.

The purpose of the Information Center, and the daily reports that flow to it, is to bring attention to any problems in the field. The center insures that no problem with the critical test equipment is overlooked or that an F-16 is grounded because of inadequate testing capability.

"So far," says Schmidt, "only one trend has shown up; one circuit board caused problems at several locations and was corrected. This indicates a good design and quality parts."



Keeping Posted. Dave Bean (center), F-16 Avionics Intermediate Shop (AIS) Technical Support Manager at Electronics, discusses the status of a test station in the Netherlands with Jim Brown (left) and Gerry Schmidt in the AIS Management Information Center.

Last AF Atlas-F Boosts Satellite

A Convair-built Atlas-F boosted the NOAA-C spacecraft into a 470-nautical mile high, sun-synchronous orbit from Vandenberg AFB, Calif., on June 23d.

The spacecraft, built for the National Oceanographic and Atmospheric Administration (NOAA), is the fourth of ten TIROS (television, infrared observation satellite) meteorological spacecraft which has been launched by Atlas E and F vehicles. It will provide the National Weather Service with high resolution imagery of ice, snow and cloud cover and of sea and surface temperatures.

The Atlas-F which launched the satellite was the last F-model retired from U.S. Air Force service as an intercontinental ballistic missile and then refurbished as a space launch vehicle. It was originally delivered to the Air Force in 1963. Twenty two E-model Atlases remain in the inventory for future launches.

Atlas Program Director Ben Wier received the following message from TIROS

Project Manager Gerald Longanecker: "I want to thank you and your fine team for the excellent ride given our NOAA-C spacecraft. The entire vehicle operation was as smooth as any I've seen. The spacecraft is doing fine, and I look forward to working with you and the Atlas team on our next launch in early 1982."

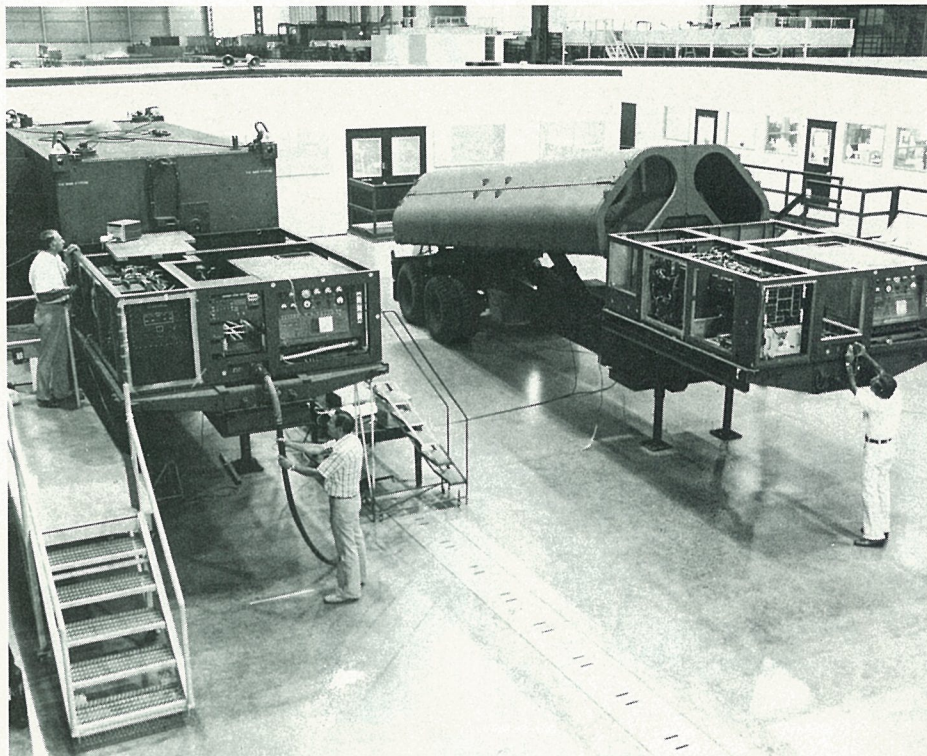
Electronics Ships AIS to Kadena AB

Seven F-16 Avionics Intermediate Shop (AIS) test stations have been shipped to Okinawa by Electronics for installation at the USAF's intermediate depot at Kadena AB.

The shipment paralleled delivery of the first two F-16 aircraft to the 8th Tactical Fighter Wing at Kunsan AB, South Korea. The AIS stations are used to test avionics equipment on F-16s.

Electronics also shipped seven stations recently to Hahn AB, West Germany, for use when the 50th Tactical Fighter Wing receives its F-16 aircraft. The 50th TFW will be the second overseas USAF unit to receive F-16s.

So far this year, Electronics has shipped 20 AIS test stations and has orders for 43 more. A total of 88 stations are in operation at 14 locations.



Nearing Completion. The first Launch Control Center (left) and Transporter-Erector-Launcher for the Tomahawk ground-launched cruise missile (GLCM) begin checkout in the GLCM Systems Integration Lab at Convair's Kearny Mesa plant. These units will be delivered to Dugway proving ground in Utah this fall.

GLCM Launch Control Center Nears Completion at Convair

The first Tomahawk ground-launched cruise missile (GLCM) Launch Control Center (LCC) is taking shape at Convair's Kearny Mesa plant.

According to Jerry Butsko, Convair's GLCM Program Director, the completed LCC will be used to check out the first GLCM Transporter-Erector-Launcher (TEL) which is also being completed at Convair. A U.S. Air Force operational GLCM unit will be made up of two control centers and four TELs.

After the LCC and the TEL are completed and checked out, they will be delivered to the Dugway Proving Ground in Utah next October. There they will be used for test firings of the Tomahawk GLCM which are scheduled for November. The GLCM development program calls for three contractor test flights and eight Air Force test and evaluation flights before full rate production decision is made in early 1983 leading to deployment of the system in late 1983.

The GLCM Systems Integration Lab at Convair, where the first LCC and TEL are being completed, can simulate LCCs and test TELs. The lab was designed and built by Convair and will be the principal checkout facility for all components of the GLCM system except for the missiles.

The LCC's shelter was made by Good-year Aerospace in Phoenix, Ariz., and the

communications equipment was built by GTE Sylvania of Waltham, Mass. The weapons control system was designed by Vitro Labs of Automation Inc., while the hardware was integrated by McDonnell Douglas Astronautics. Convair is the prime contractor for the Air Force GLCM program.

Control System At Electronics Receives Approval

A new production performance measurement system at Electronics Division has received official tri-service approval from the Department of Defense. The new system is called the Cost/Schedule Control System (C/SCS).

Adoption of the C/SCS at Electronics means that the division now has a fully approved system for control and management of existing development and production contracts and places the division in a better position to compete for future new business.

Dick Engel, Electronics C/SCS Coordinator, said, "If the control system isn't validated by the government, there are a lot of jobs that a company can't even bid on, because they require a Cost and Schedule Control System in the contract."

Approval of the Electronics C/SCS came after two years of coordinated efforts between U.S. Air Force and Electronics personnel on the F-16 AIS program. Approval of the system by the Air Force, Army and Navy was announced by Brig. Gen. Wilma Vaught, Deputy Chief of Staff, Comptroller, for Air Force Systems Command.

Electronics received the Air Force's 100th Contractor Validation in the program that is a major Department of Defense effort to implement better cost and schedule controls.

R. Woodle Named Services Company Vice President

Roy V. Woodle has been named Vice President of Marketing for General Dynamics Services Company (GDSC). He formerly was Director of Marketing.

Woodle will report to Dorthman E. Veirs, President of GDSC, and will be responsible for all of GDSC's marketing functions.

He is a 23-year GD employee with engineering and management field experience with Convair prior to his assignment to Corporate Headquarters in 1975 as Corporate Director - International Operations. In 1979, Woodle joined GDSC as Director of Administration and Support.

F-16 Completes F-101 DFE Engine Flight Program

Flight demonstration of the General Electric F-101 Derivative Fighter Engine (DFE) in a U.S. Air Force F-16 was completed recently at Edwards AFB, Calif.

The entire flight test program, 58 flights in 75 flight hours, was conducted using only one engine, the first F-101 DFE ever constructed. The F-16 Fighting Falcon used in the test program was the first full scale development aircraft.

The tests included simulated operational missions to analyze engine usage and life cycle projections.

After completion of the flight test program, the engine was removed and reworked at Edwards and is to be a spare for the U.S. Navy/Grumman F-14/F101 DFE flight test program that is to be conducted later this year.

The F-101 DFE engine is a derivative of the engine used to power the B-1 bomber.

Thais Fly F-16/79

Royal Thai Air Force (RTAF) pilots have completed a five-day, 10-flight evaluation of the Fort Worth F-16/79.

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Thousands Thrilled by F-16 at Paris Air Show



Paris 1981: The Paris Air Show, June 4th through 14th, brought General Dynamics representatives together with officials and aerospace leaders from throughout the world, while featuring dazzling daily flight demonstrations of the F-16 before hundreds of thousands of spectators. Sen. Barry Goldwater, Republican of Arizona, President Reagan's personal representative at Paris, reported to the U.S. Senate that the Fighting Falcon "more or less stole the show" among military aircraft. The single-seat F-16A, piloted by Neil R. Anderson (See Page 1) and James A. McKinney, Experimental Test Pilot from Fort Worth, was leased from the Danish Air Force just after coming off the assembly line in Belgium. **Top row of photos shows:** Left, a Ground Launched Cruise Missile (GLCM) supplied by Convair to the U.S. Air Force for display at Paris. Center, F-16 in flight demonstration. Right, F-16 viewed by general public while parked outside GD hospitality chalet. **Second row:** Left, Sen. Goldwater and Anderson, at GD chalet. Center, F-16 in flight. Right, Henry Crown, a member of GD's Board of Directors and Chairman of its Executive Committee, observing flight activities with David S. Lewis, Chairman of the Board and Chief Executive Officer, and U.S. Navy Secretary John F. Lehman. **Third row:** Left, Anderson greeted after flight by well-wishers on veranda of chalet. Center, GD hosts and guests watching F-16 aerial display. Right, Senate Armed Services Committee Chairman John Tower, Republican of Texas, stands between Mr. and Mrs. Lewis and Herbert F. Rogers, Vice President and now General Manager of the Fort Worth division. **Bottom row:** Left, Vice Adm. Ernest R. Seymour (in light suit), Commander of the Naval Air Systems Command, stands between McKinney and Richard E. Adams, now Corporate Executive Vice President - Aerospace. On other side of McKinney are David J. Wheaton, Vice President - Marketing at Fort Worth, and Lt. Cmdr. Mark W. Dady, Adm. Seymour's aide (far left). Center, Lester Crown, GD Executive Vice President and President of Material Service Corporation, sits in F-16 cockpit demonstrator in chalet, receiving explanation of its systems from Anderson. Right, McKinney and Anderson are visited at chalet by Space Shuttle astronauts John W. Young and Robert L. Crippen (right).

EB-Built USS James K. Polk Completes 2,000th Strategic Patrol

The nuclear-powered USS *James K. Polk* (SSBN 645), which was launched by Electric Boat in 1965, returned to its home port at Charleston, S.C., June 17th, amid uncharacteristic fanfare.

The U.S. Navy broke its traditional secrecy about the return of its ballistic missile submarines, because the *Polk* had just completed the 2,000th undersea patrol for the fleet of 41 missile-carrying

subs since the patrols began in 1960.

The *Polk*, which had been at sea 68 days, eased into port amid an archway of water sprayed from welcoming tugs, band music, speeches and cheers from families and dignitaries.

Among the greeters on hand was General Dynamics President Oliver C. Boileau.

Hill AFB F-16s Win Bombing Contest

Continued from Page 1

they took off until they landed. During the 16 competition sorties, the F-16 team achieved a total of 88 "kills"—while suffering no "losses"—in engaging the interceptors.

By contrast, the other four teams received a total of 42 "losses" and collectively made only one "kill."

Another important aspect of the competition was the ability of the maintenance crews to prepare the aircraft for their bombing sorties and after their return to

turn them around for another sortie. Ground crews were graded on their ability to refuel and reload the aircraft with bombs and 20-mm. ammunition. The 388th TFW ground crews averaged 10.5 minutes turn-around time during the competition.

"Our crews had little more to do than fill them up, check the oil and clean the canopies after each sortie," Riggs said. "In the month we were deployed, we had to use only 14 components from our spares kit."

GD Earnings Decline During Second Period

General Dynamics earnings for the second quarter of 1981 were \$23.8 million, or 42 cents per share. This was a decline of 56 percent from 1980's second quarter earnings of \$54.4 million, or \$1.00 per share, which included an investment tax credit of \$4.7 million, or 9 cents per share, attributable to the delivery of a liquefied natural gas tanker.

Earnings for the first half of 1981 were \$54.6 million, or 98 cents per share, compared to \$90.7 million, or \$1.67 per share, reported in the first six months of 1980.

Sales for the quarter and the first half of 1981 were \$1.26 billion and \$2.52 billion, respectively, compared with the \$1.18 billion and \$2.25 billion reported in the same periods last year.

Funded backlog at the end of the first half of 1981 was \$10.1 billion, and total funded and unfunded backlog was \$10.8 billion.

"These disappointing earnings were primarily the result of three factors," said David S. Lewis, Chairman and Chief Executive Officer. "First, the nationwide coal miners strike resulted in a substantial loss at Freeman United Coal Mining Company; second, a decision to provide a reserve to cover anticipated losses and unabsorbed overhead resulting from the current low direct labor workload at Quincy Shipbuilding Division; and third, the general slowdown in our telecommunications and information systems subsidiaries due to the current depressed business conditions and high interest rates combined with the continued high level of research and development effort in those operations."

On the positive side, Lewis said Electric Boat is meeting its extremely demanding submarine delivery schedules established early this year.

"Initial sea trials of the lead Trident submarine, *Ohio*, were very successful, and the ship is now being readied for the final sea trials leading to scheduled delivery in the fourth quarter. Three of the six SSN 688-class attack submarines scheduled for delivery this year are now in service, the fourth completed its initial sea trials on July 27th, and work on the other two and the follow-on nine 688s is progressing as planned. Work on the additional seven Tridents on contract is progressing at an accelerated rate," Lewis said.

While operating earnings at Electric Boat increased slightly in the 1981 quarter, net earnings were down because of lower investment tax credits compared to those of 1980.

Earnings for the second quarter were led by the Fort Worth Division as it

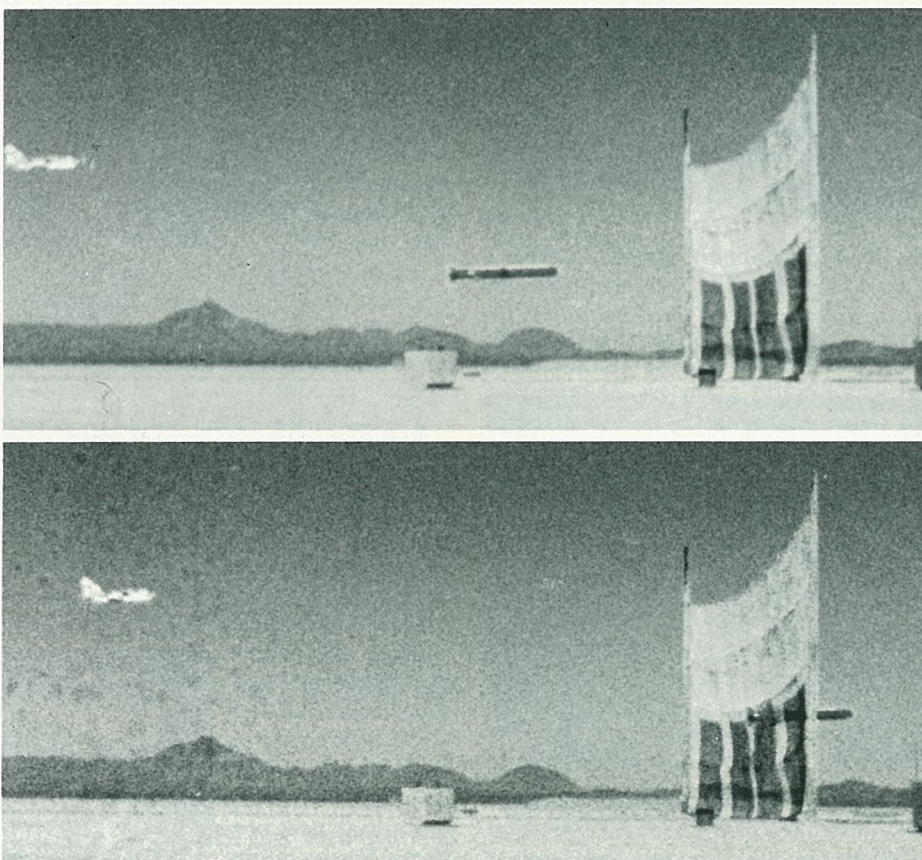
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GD World

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August 1981



Bull's-Eye. In scenes from a tracking camera, a Convair/U.S. Navy Tomahawk cruise missile hits its target at the Tonopah Test Range, Nev., on July 10th. The missile was launched from a submarine off the California coast and flew a fully-guided land attack mission of approximately 300 miles.

After 300-Mile Flight, Tomahawk Scores a Bull's-Eye on Target

A Convair-built Tomahawk cruise missile made its first intentional hit on a land target July 10th, in a test concluded at the Tonopah Test Range in Nevada.

The missile was launched from a torpedo tube of the submarine *USS Guitarro* off the California coast.

The flight path crossed the California coastline, and the missile then flew a fully-guided, land-attack mission to the target area approximately 300 miles from the launch point. In the target area, the missile overflowed scoring devices and ripped through a target, impacting on the desert floor beyond the target area.

It was the third test of the new Digital Scene Matching Area Correlation (DSMAC) terminal guidance system. The first test was launched from a US Navy A-6 attack aircraft on February 15th, and the second was a submarine launch on March 28th. In both those missions, the missile deliberately overflew the target and was recovered by parachute for later use.

Another part of the July test was transmission of the mission data to the submarine by use of external radio com-

munications. The mission was planned by Navy personnel using the Theater Mission Planning System located in Hawaii.

This was the 73d Tomahawk test flight in a program that began in 1976.

AIS Move to Kadena Brings AF Praise

The setup of a F-16 Avionics Intermediate Shop (AIS) at Kadena AB in Okinawa earlier this year was one of the smoothest on record, according to U.S. Air Force officials.

A special airlift mission carried the Electronics Division-built equipment to the Pacific island, and five hours after the aircraft had landed, power was applied to the first AIS station. Other stations were operational within a few days.

An Air Force official at Kadena said, "To be up and running and testing line replaceable units in under five days is fantastic."

K. H. Ledford of the F-16 System Program Office at Wright-Patterson AFB, Ohio, said, "This is how it should be done."

\$213 Million Phalanx Job To Pomona

Pomona has received a \$212.9 million contract from the U.S. Navy for continued production of the Phalanx radar-directed shipboard gun defense system.

The new contract is for production of 75 Phalanx units, spares and ancillary equipment, plus software and support during 1982. Under the contract the U.S. Navy will receive 69 systems and the Japanese Maritime Self-Defense Force will receive six. Some of the spares will be delivered to the Royal Saudi Naval Forces.

The new award is the third Phalanx production contract the division has received for the highly effective close-in weapon system. The first contract for the production of 37 Phalanx units was awarded in 1977, followed by a second production contract for 44 systems in 1979. The first production unit was rolled out at Pomona on August 9, 1979.

Phalanx is now installed aboard four U.S. Navy aircraft carriers, the *USS America*, *USS Coral Sea*, *USS Enterprise* and the *USS Vinson*, and four U.S. Navy cruisers, the *USS Biddle*, *USS England*, *USS Jouett* and the *USS Belknap*.

In addition, Phalanx has been installed aboard the *Kurama*, a Japanese destroyer. Phalanx units are also being installed on six Royal Saudi Naval Force ships.

Phalanx is designed to protect ships against sea-skimming missiles that penetrate the fleet's outer defenses.

The Phalanx gun system's unique defensive capability is based upon closed-loop spotting, a breakthrough in radar technology. This technique uses advanced radar and computer technology to pinpoint targets and automatically and continuously direct the gun system's 20-mm. projectiles onto the target.

GD Joint Venture Receives Contract In Saudi Arabia

Mansour-General Dynamics Limited has received a \$12 million contract to provide a measurement standards laboratory for the Research Institute of the University of Petroleum and Minerals in Dhahran, Saudi Arabia.

Mansour-General Dynamics is a Saudi Arabian joint venture company consisting of General Dynamics Corporation and Mansour Corporation and is registered in the Kingdom of Saudi Arabia.

The three-year project calls for facility engineering, installation of precision instruments and establishing a maintenance and repair facility, a technical library and a spare parts inventory and logistics control system for the laboratory. An existing facility will be modified to incorporate the necessary environmental controls to assure optimum performance of the instruments.

Mansour-General Dynamics is to identify the equipment which meets the metrological requirements necessary so that the facility's capabilities for measurement and standards related to electrical, mechanical, microwave, time and frequency, temperature and humidity and light will be of the quality of any primary standards laboratory in the United States.

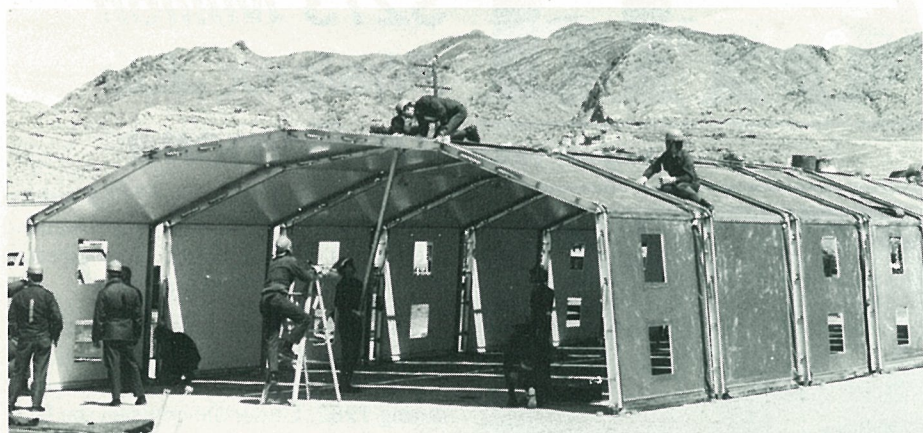
General Dynamics Services Company, headquartered in San Diego, will provide management and technical support to Mansour-General Dynamics Limited and conduct a major share of the project.

General Dynamics Services Company was established in 1979 to provide support services for products produced by General Dynamics divisions and subsidiaries and also provide field engineering, test and site management, training, repair, maintenance and other services required in countries around the world.

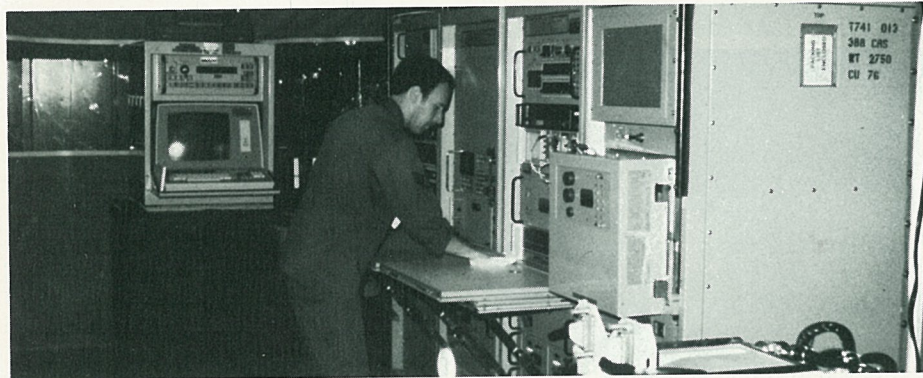


In Service. Bulkfleet Pennsylvania, a 503-foot, deep-notch barge built by Quincy Shipbuilding Division, is now in service. Bulkfleet Pennsylvania and a sister barge, Bulkfleet Texas, are

each capable of transporting 192,000 barrels of petroleum products. The barges are powered by tugs which fit into the stern of the vessels.



Setting Up Shop. Airmen from the 4449th Mobility Support Squadron erect a Harvest Bare support building (above) to house a F-16 Avionics Intermediate Shop at Wendover, Utah. Below, inside the building an airman gives a final cleanup to the Computers and Inertial Guidance shop station inside a tent that was installed for climate and dust control.



AIS Proves It Can Go Anywhere The F-16 Fighting Falcon Can

An Electronics-built F-16 Avionics Intermediate Shop (AIS) was successfully deployed in temporary buildings during a bare base test by units of the Tactical Air Command in June and July.

The test proved that the critical AIS test equipment can follow the Fighting Falcon anywhere in the world.

The equipment was deployed to Wendover, Utah, the site of an abandoned World War II base, to support eight F-16s from Hill AFB, Utah. The F-16s participated in a Tactical Air Command Red Flag exercise at Nellis AFB, Nev.

During the deployment, two portable support buildings were erected to house the AIS.

Within the buildings, the four shop stations were each surrounded by a "tent" which provided isolation and aided in both climate control and dust suppression. Brian Donnelly, Electronics Project Engineer, said that two air conditioning units supplied each station area with filtered air which provided positive air pressures within each tent and building.

Air Force personnel erected the buildings and installed and operated the AIS equipment.

An Air Force sergeant said that during the deployment the shop ran tests on 28 line-replaceable units which came from the aircraft at Wendover and from the parent unit at Hill. The shop supported the F-16s during all the sorties flown from Wendover in the 26 days of the deployment.

According to the sergeant, the four shop stations performed up to expectations and all were working well when the shop was dismantled and returned to Hill after the nearly one month of deployment.

"In more than 600 hours of operations, the shop performed as well or better than a normal installation at a permanent base," he said.

Dave Bean, Electronics F-16 AIS Technical Support Manager, said, "The

main lesson we learned was that the AIS equipment can function in a bare base deployment as well as it does on a permanent air base," he said.

USS Dallas Joins Submarine Fleet

The USS *Dallas* became part of the U.S. Navy's submarine fleet on July 18th at the Submarine Base in Groton, Conn. She is the third Electric Boat-built, 688-class submarine to join the fleet this year.

At the commissioning ceremony for the USS *Dallas* (SSN 700), Texas Governor William P. Clements Jr., the principal speaker, said, "The Navy is an extremely important part of our nation's defense, and the submarine service is the cutting edge."

P. Takis Veliotis, GD Executive Vice President—Marine and EB General Manager, also spoke during the ceremony, saying, "These submarines—when fitted with cruise missiles—will very likely be the most important single strike force weapon in the nation's arsenal and a significant expansion of the Navy's role in the nation's defense."

Referring to EB's determination to deliver seven submarines to the Navy this year, Veliotis said that EB's basic objective "is to make these commissioning ceremonies a regular event."

Veliotis assured the crowd that EB is making equally good progress with the additional 12 688-class submarines that are currently under construction at the yard.

USS *Dallas*'s three sister ships scheduled for delivery later this year are: *La Jolla* (SSN 701), *Phoenix* (SSN 702) and *Boston* (SSN 703). *Ohio* (SSBN 726), the first Trident missile submarine, is also scheduled for delivery by EB this year.

GD Forms Data Systems Division; Barlow Named Vice President, GM

General Dynamics has formed a new division from the elements of its former Data Systems Services organization. It will be known as Data Systems Division.

Melville R. Barlow has been named Vice President and General Manager of the new division.

According to David S. Lewis, GD Chairman and Chief Executive Officer, elevation of the corporation's computer organization to divisional status is clear recognition of the importance of



Barlow

its services to the success of the company.

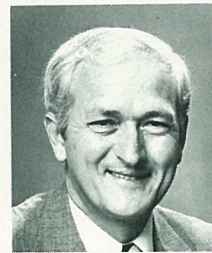
Data Systems Division will consist of the existing computer centers in Norwich, Conn., Fort Worth and San Diego. The division's headquarters will be in St. Louis; nearly 2,400 employees work for the new division at its four locations.

Barlow, 51, has been corporate Director of Data Systems Services since 1975, shortly after GD began consolidation of all its data processing functions. A native of New Britain, Conn., Barlow was graduated from Michigan State University in 1951 with a Bachelor of Science Degree in Mechanical Engineering.

James Bridges Named President Of Stromberg-Carlson Corp.

James M. Bridges has been named President of Stromberg-Carlson Corp.

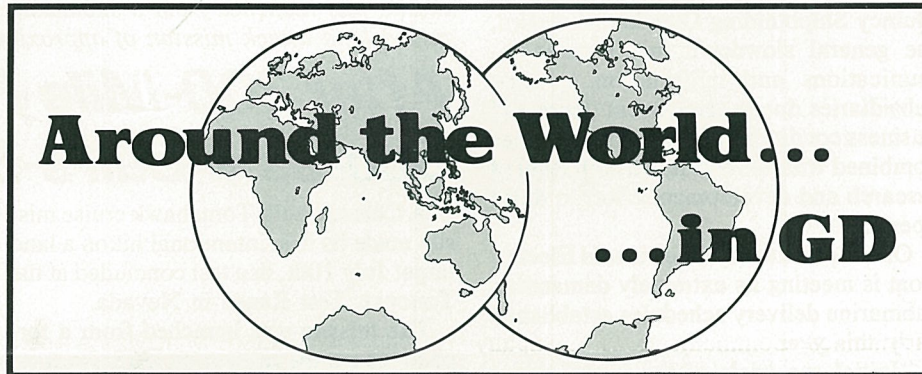
Under Bridges' leadership, Stromberg-Carlson will continue its strong telecommunications research and development efforts and implement its plans to introduce additional new products for its utility and business customers.



Bridges

In his new position, Bridges will report to Guy W. Fiske, General Dynamics Executive Vice President-Commercial. Bridges has been serving as Acting General Manager of Stromberg-Carlson since February. Prior to that assignment he had been Vice President-Finance for the company.

He joined the company in 1978 after 12 years with the IBM Corp., where he had held a number of increasingly responsible positions in the financial area.



CHQ: T. A. McFarland transferred from Electronics and was promoted to Corporate Representative, International Programs... George R. Latter Jr. transferred from Convair and was promoted to Auditor... Edward F. Guckes was promoted to Senior Staff Accountant... Robert L. Whitmire joined as Corporate Manager, Legislative Affairs—Navy Programs... Linda S. Vandas was promoted to Corporate Cash Administrator.

Fort Worth: D. V. Allen, W. B. Atkins, J. R. Vaughan and R. Vickers were promoted to Senior Project Engineer... T. D. Arber to Material Planning Supervisor... J. K. Beamish to Engineering Chief... J. Blok to European Resident Manager... B. R. Carroll to Manager—Program Acquisition Requirements... R. D. Davis to Foreman... L. Everett to Manager of Contracts... D. M. Hancock to Program Director (F-16 Growth)... R. D. Heath and S. O. Majors to Assistant Project Engineer... J. R. Hoodenpyle to Manager—Multinational/Special Projects... F. P. Kirkland, L. L. Patton and J. C. Roberts to Project Engineer... A. P. Madsen and D. W. Milburn to Engineering Manager... J. B. McGaughy to Chief of Quality Assurance... E. M. Petrushka and M. E. Waddoups to Engineering Director... J. L. Quick to Change Project Supervisor... K. M. Sheppard to Tooling Supervisor... W. H. Van Fleet Jr. to Engineering Specialist Senior... E. R. Whitton to Chief of Support Program Management... W. A. Moch to Project Manager.

ATC: Michelle LeMaster was promoted to Manager, Sales Support.

Electric Boat: James Platt was promoted to Quality Audit Administrator... Ray Sanborne to Foreman... Robert Driscoll to News and Information Specialist... Robert Schmidt to Foreman, Reactor Plant Services... Donald Alfiero to Ship Superintendent... Charles Channing to Contract Administrator... Dennis Chin to Supervisor of Quality Assurance... Thomas Devine to Employee Relations Administrator—Quonset Point... Richard Fickel to Supervisor of Educational Services... F. Gargione to General Foreman at Avenel... Melvin Hodgkins and Thomas Jacobs to Test Operating Engineer... W. Kaczynski to Director of Materials at Avenel... Thomas Kelly to Chief of Packaging—Quonset Point... Claudia Lake to Labor Relations Representative... Anthony Masters to Supervisor of Planning—Material... Sheila Phillips to Supervisor, Records Section... Lewis Sawyer to Chief of Engineering... A. Shanahan to Foreman II... Paul Terry to Assistant Program Management Chief... Paul Towne to Engineering Supervisor.

DSD: P. Gilberto was promoted to Supervisor—Data Systems at EDSC... P. Confoni to Manager CAD/CAM at EDSC... R. Crocker to Software Engineer at EDSC... T. R. Rogers to Chief—Technical Services at WDSC... B. T. Wilson to Supervisor—Data Systems at WDSC... F. W. Purdy to Chief—Engineering Software at WDSC... J. Gray to Programmer/Analyst at EDSC.

Pomona: Edward E. Lord and James R. Womack Jr. were promoted to Chief, Product Support... Allen C. Hagelberg, Lawrence H. Frazier and Glenn R. Barr to Senior Project Engineer... Robert W. Wheeler, William J. Grief, John F. Bryant, Gerald C. Brown, Robert A. Balslev, Dave W. Holmes, William F. Herbert Jr., Michael B. Carson and Kenneth J. Senn to Group Engineer... Donald D. Skinner and Howard O. Brady to Program Director... Loyd L. Torrey to Assistant Program Director... Gary R. Lingle and Arnold Shapiro to Section Head... John E. Kozyra to Assistant Marketing Director... Robert M. Haner to Manufacturing Engineering Staff Specialist... Craig L. Johnson to Project Engineer... Paul H. Heck to Project Engineer—Horizontal Integration... Monte L. Taylor to Manager, Army Portable Systems Administration... Jerry M. Mowell to Technical Procurement Administrator... Albert C. Rodriguez to Assistant Project Engineer.

Savings and Stock Investment Values

Salaried	June 1979	June 1980	June 1981
Government Bonds	\$ 2.1830	\$ 2.4811	\$ 2.6307
Diversified Portfolio	1.4280	1.8048	2.1383
Fixed Income	1.0000	1.0980	1.2161
Hourly			
Government Bonds	2.1832	2.4790	2.6279
Diversified Portfolio	1.4608	1.8413	2.1851
GD Stock	\$16.1250*	\$33.0625*	\$32.3750

*Reflects 2 for 1 stock split of November 1980.



Artist Honored. Roy Gjertson, an illustrator, has been named Convair's "Employee of the Year" for 1980. He is shown working on a new painting of the Convair Centaur upper stage with the Galileo probe leaving the Space Shuttle.

Roy Gjertson Named Convair's Employee of the Year for 1980

Roy Gjertson, an illustrator, designer and exhibits coordinator in Convair's Art and Editorial Department, has received the 1980 General Manager's award as Employee of the Year.

Since joining Convair in 1969, Gjertson's illustrations for company product lines have been used worldwide in publications, proposals and displays. His illus-

trations have also been used in corporate publications, and he has been the lead designer on a number of corporate exhibits.

In addition to his illustrations for Convair, Gjertson has illustrated children's books, and has designed two U.S. postage stamps: the Gettysburg Civil War Centennial stamp in 1965 and the NASA Mariner 10 stamp in 1973.

GDCC Introduces DATABANK Telephone Accounting System

DATABANK, the third and latest generation in telephone accounting systems, has been unveiled by General Dynamics Communications Company (GDCC).

Designed and manufactured by GDCC's subsidiary, Com Dev, DATABANK—in addition to having all the features of previous systems—can handle multiple, simultaneous requests for information to be displayed, transmitted or printed.

"It has all the capabilities of its predecessors, ACCOUNTANT and CALL-QUEST, and more," said David Groome, DATABANK product manager.

Groome has conducted seminars in various key market cities to introduce the new product to the company's district sales and operations personnel, as well as prospective customers.

DATABANK is the only product on the market that can meet the needs of business executives who require sophisticated information to manage and control their communications systems and their costs, Groome said.

DATABANK boasts a number of important features.

- Because it can be accessed by high-speed printers or video displays, various personnel can simultaneously tap the computer's memory and retrieve information pertinent to their function.

- The accounting department can call up a display of long distance charges so that costs can be billed back to the appropriate departments.

- A traffic analysis of the types of lines being used and the frequency of use can be printed out for a management/finance committee to examine the need for increased or decreased WATS line service.

DATABANK will be premiered nationally in September when it will be exhibited at the Telecommunications Association Conference in San Diego,

Calif., and at the Baltimore Business Show in Baltimore, Md. It also will be exhibited twice in October in New York at the Communications Managers Association Show and the International Communications Association Regional Show.

Facility Engineer Awarded \$5,768 For Saving Energy

J. B. Evans, a Facility Engineer at Convair's Lindbergh Field plant, is \$5,768 richer because of a suggestion he submitted concerning electrical power supplied to two milling machines at the plant.

Evans noted that the two milling machines, used for making large parts up to 50 feet long for the DC-10 and Space Shuttle fuselages, each had eight spindles, four of them being dual speed. The existing wiring for the drive motors for the dual speed motors used two 100-horsepower motors and frequency converters in the high speed mode.

These two large motors and converters ran all of the time, even though the high-speed mode was seldom used. Evans proposed that the spindle controls be rewired and the converters be replaced by a single transformer for each mill. Power was then used only when the actual high-speed capability was needed.

Evans' award was based on first year's net savings of \$46,155 plus a 25 percent bonus that is given for energy savings suggestions.

Convair Recognized For Blood Donations

The support given by Convair employees to the San Diego County Blood Bank was recognized recently when the bank presented a plaque to the division.

Individual plates on the plaque list the results of Convair's blood drives over the past few years: beginning in 1975, blood donations by Convair employees totalled 138 pints; in 1976, this grew to 154 pints; 1977 to 369 pints, 1978 to 692; 1979 to 721, and in 1980 topped 1,000.

Convair's first blood drive in 1981 brought in 562 pints; a second drive is planned for early November.

Awareness Is Key

There Is No 'Trivial' Information In Defense Technology Programs

It's no secret that foreign intelligence services are vitally interested in our defense and high technology programs, says Ronald H. Beatty, Corporate Manager-Industrial Security.

"Espionage has been sensationalized as a popular theme of contemporary fiction," Beatty says, "but aside from the escapades of the likes of 007, we have to remember that real spies do exist. Because General Dynamics is so active in programs foreign intelligence services are interested in, we are a prime target for their efforts."

The Federal Bureau of Investigation says the most prized intelligence data that foreign agents seek is information that has been classified by the U.S. Government. However, Beatty points out, there is much information unclassified, much of which may seem trivial, that can be of great value to foreign intelligence organizations.

"In putting together an estimate of U.S. military strengths or technological progress, foreign intelligence services seek all sorts of information," Beatty says. "A small bit of information can be a very important piece of a much larger puzzle. It could lead to an accurate assessment of a weapon system, or it could be the missing link in an industrial process that could give the foreign power a quantum jump in technology, neutralize our advantage and save them millions of dollars of developmental funds in the process."

To protect the interests of our nation and General Dynamics, Beatty strongly urges all GD employees to recognize that there is a threat posed by foreign intelligence organizations and to be aware of the various ploys those organizations have used in the past to steal information.

First, he says, foreign intelligence agents frequent locations and occasions that are attended by people who have access to information the agents are interested in. International trade shows and symposiums are prime examples, where the social environment is conducive to easy introduction. Agents will attempt to befriend their target, often identifying themselves overtly, but avoiding sensitive subjects until after a more personal relationship is established. Other times they may mis-

represent themselves as citizens of a country that is friendly to the United States or is allied to ethnic groups in this country; the agents may also represent themselves as scientists or technicians who claim that national or ideological allegiances are secondary to professional interests.

After the contact is made and the target evaluated, the development process begins. Typically this involves treating the target to entertainment, gifts, or special considerations, followed by modest requests for assistance and favors which are well within the target's ability and power to provide. The object is to lower the target's wariness and compromise the target. In extreme cases, the agent can resort to blackmail.

Another tactic, known as exploitation of hostages, can occur if the target has relatives living in foreign countries and can be coerced by concern for their safety.

To effectively counter these approaches, General Dynamics employees should, first, be sensitive to the threat, to know it does exist, and second, be wary of strangers who make an unusual effort in forming friendships. In addition, strangers who seek information that does not appear to be related to their professed area of interest or who do not seem particularly knowledgeable in their professed field should pique curiosity and put you on guard.

Agents of foreign intelligence services need not be foreigners. They could be Americans who have been recruited as spotters.

Beatty says, "Whenever someone begins to inquire into aspects of your knowledge or activity which are classified or otherwise sensitive, you should certainly pause to consider whether the inquiry is normal curiosity, or whether it may be the beginning of an attempt to secure intelligence information. We are obligated to do so as responsible citizens of the United States and as employees of General Dynamics entrusted with defense information."

When in doubt, seek advice: contact your local General Dynamics Security Officer or the local office of the FBI.

Fort Worth Reduces Energy Usage; Conservation Program Continues

Energy consumption at Fort Worth has been reduced drastically by a program that began after the oil embargo in late 1973 caused energy prices to skyrocket.

While energy usage has been reduced during the last eight years, it's only been recently that most employees could actually see the effort going on—the switch from fluorescent to sodium vapor lights in the mile-long assembly building, according to Jim McMichael, Manager of Energy Conservation at Fort Worth.

The change is obvious because the high pressure sodium vapor lamps give off a yellow-orange light, in contrast to the stark white of the fluorescent lights.

Some of the other fuel cutting measures that have been adopted, such as switching from steam to electrically-driven water chillers for the central air conditioning system, have not been as visible.

Fort Worth, with nearly 5 million square feet of air conditioned working space for about 17,000 persons, is a large user of energy.

In 1980, almost 921 million cubic feet of natural gas and 221 million kilowatt hours of electricity were used to heat, cool and light the facilities and to power the equipment needed for the F-16 production program.

For record-keeping purposes, costs of natural gas and electricity are computed using the British thermal unit (Btu). A Btu is the quantity of heat required to warm the temperature of one pound of water one degree Fahrenheit near 39.2 degrees F.

Using that measurement, in the base year of 1972, the division used 2 trillion, 519 billion Btu's. That compares with 1 trillion, 682 billion Btu's used in 1980, a reduction of 30 percent, and one that well exceeds target cuts set by the U.S. Air Force and the U.S. Department of Energy for Fort Worth.

As consumption has dropped, however, the cost has increased 642 percent, from 77 cents per million Btu's in December 1972 to \$5.72 per million last month.

It is the dramatic increase in energy costs that has spurred the drive to use less energy, says McMichael.

The switch to sodium vapor lights will lower costs for illuminating the plant since they use less than half the amount of electricity of the tubes they replace. The 400-watt bulbs—there are 2,064 of them along the 200-foot-wide, mile long assembly building—also cut down on ultraviolet rays. Energy cost savings will pay for the Air Force-funded \$2.1 million switch in less than four years.

Other cost effective changes that have been made include the reduction of overall lighting levels, the reduction of excess hot or cold air drawn into the buildings and the installation of special thermostats in some areas.

Several other programs are also underway and others are being looked at in the conservation effort. One is to reduce the waste heat in the chemical processing area by installing retractable covers on the process tanks.

GD World

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DOD Communications Satellite Boosted by Atlas-Centaur

An Atlas-Centaur rocket built by Convair successfully boosted a Department of Defense communications satellite into orbit on August 6th from the Kennedy Space Center.

The powerful launch vehicle thundered off the launch pad sending the fifth in a series of Fleet Satellite Communications (FLTSATCOM) satellites aloft. The satellites form the spaceborne portion of a worldwide Navy, Air Force, and Department of Defense system that provides communications between naval aircraft, ships, submarines, ground stations, elements of the Strategic Air Command and

the presidential command networks.

The FLTSATCOM will be placed in a geostationary orbit about 22,200 miles above the Equator. At that altitude, because the satellite in orbit and the Earth rotate at the same speed, it remains in position over one spot on the Earth. From its orbital location the FLTSATCOM will provide two-way communications over 23 super high frequency channels.

The FLTSATCOM program is managed by the Naval Electronic Systems Command.

Convair-built Atlas-Centaurs have been NASA's standard boosters for placing communications satellites into orbit as well as being the prime launch vehicle for all planetary missions. In addition to the series of FLTSATCOMs, Atlas-Centaur has boosted seven Intelsat IV satellites; five larger and more powerful Intelsat IV-As; two new generation Intelsat Vs; and three Comstar domestic communications satellites.

The Centaur high-energy upper stage has also been used with the Titan III booster to launch the Helios sun probes as well as the interplanetary Voyager and Viking missions to Mars, Jupiter and Saturn.

The recent launch was the 464th for Atlas and the 64th for Centaur. The first Atlas was launched in 1957, and the first Atlas-Centaur was launched in 1962.

RAM Intercepts Simulated Missile

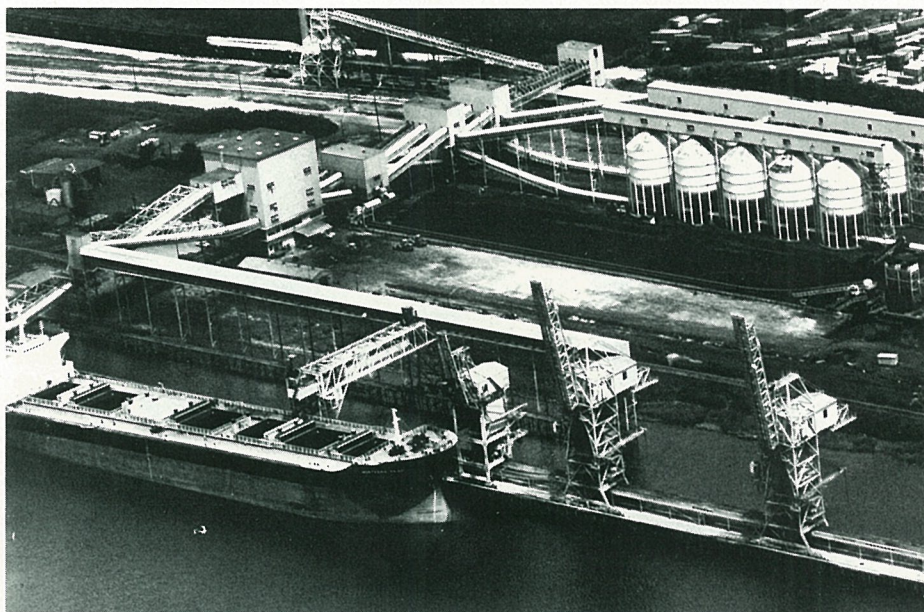
A RAM missile, developed and produced by Pomona, has successfully intercepted a remotely controlled aircraft simulating an anti-ship missile at White Sands Missile Range, New Mexico.

RAM, also known as the Rolling Airframe Missile, is a lightweight, low-cost, high firepower missile system which is designed to provide antiship missile defense for a wide range of ship configurations.

The test was the first of a series of guided flight tests of the tactical configuration of the RAM missile and confirms RAM's basic design integrity.

Additional tests are scheduled later this year including guided flights over water at the Pacific Missile Range, Calif.

The RAM system is being developed under the joint sponsorship of the U.S. Navy and the governments of the Federal Republic of Germany and the Kingdom of Denmark.



Export Contract. Illinois Basin coal, mined by Freeman United Coal Mining Co., is loaded directly from a unit train onto a collier bound for Spain at a terminal near New Orleans. Freeman United's contract to export the Midwestern coal has demonstrated its competitiveness with traditional export coal mined in the Eastern United States.

Freeman United Expands Market By Exporting Illinois Coal to Spain

Freeman United Coal Mining Co. has entered the European market with a shipment of coal to Spain.

Under a \$3.75 million export contract signed last April, Freeman United is to ship 125,000 metric tons of Illinois Basin coal to Spain with an option for another 125,000 metric tons. The coal will be used by Spanish cement producers.

The first shipment of 33,000 metric tons was made in July and was transported by the Illinois Central Gulf Railroad to New Orleans, where it was loaded aboard a collier bound for the Spanish port of Almeria.

Lucian A. Lincoln, Freeman United's President, said initial contact with Spanish authorities was made through Fort Worth Division officials who were talking to the Spanish about possible sale of the

F-16. "Fort Worth brought up the fact that another General Dynamics division mines coal," Lincoln said, "and the groundwork was laid."

Lincoln said the contract called for Freeman United to make all transportation arrangements to the Spanish ports. He said it was not only Freeman United's first export shipment, but it was its first made to the Gulf Coast by rail. Previously, shipments had been made by barge down the Mississippi River to a New Orleans terminal.

Lincoln said the shipment was a breakthrough for Illinois Basin coal, which comes from Southern Illinois, Indiana and western Kentucky. Usually coal from eastern Appalachia is mined for export because it has lower sulphur content and is near the Atlantic Coast.

Freeman United, however, convinced Spanish officials to test the Illinois Basin coal because it has been used successfully for many years by cement producers in this country.

Lincoln said the company believed that the use of Illinois Basin coal by the Spanish would prove successful and would lead to "long term arrangements" not only with the Spanish but in similar markets in Italy and Greece.

The second shipment to Spain is expected to be made in early September.

Phalanx Scores Numerous Hits During Exercise

Phalanx, the radar-controlled, automatic gun system developed and produced by Pomona, scored impressive results in a fleet firing exercise conducted recently on the aircraft carrier USS *Coral Sea*.

Numerous hits were scored against a TDU-22 towed target. The target, seven inches in diameter, simulated an attacking missile.

The exercise was the latest in a series of successful Phalanx firings by units installed aboard the aircraft carriers USS *America* and USS *Coral Sea*, and the cruisers USS *Biddle* and USS *England*.

The Navy has said it plans to place Phalanx on over 240 ships ranging from frigates to carriers.

All U.S. Navy Phalanx systems have been installed with the assistance of a Pomona team of engineers. These engineers have also supported installation of Phalanx on board ships of Saudi Arabia and Japan. Recently, successful tracking exercises were conducted aboard two Royal Saudi Naval Force (RSNF) ships, the *As Saddig* Saudi Arabia and the *Al Farouq* Saudi Arabia.

GD Earnings Decline During Second Period

Continued from Page 1

maintained an ahead-of-schedule position while increasing the rate of production on the very important F-16 program, Lewis said. The air forces of six nations took delivery of a total of 82 F-16s during the quarter, including 55 from the Fort Worth plant and 27 from the two assembly lines in Europe.

"Foreign sales of the aircraft continue to look bright with the U.S. Government now considering requests for F-16s from Pakistan and Venezuela," Lewis said. "We are also encouraged by the fact that the firm requirement for the F-16 and its mature production base have made it the leading candidate to demonstrate the cost savings potential of the Defense Department's proposed multiyear procurement plan."

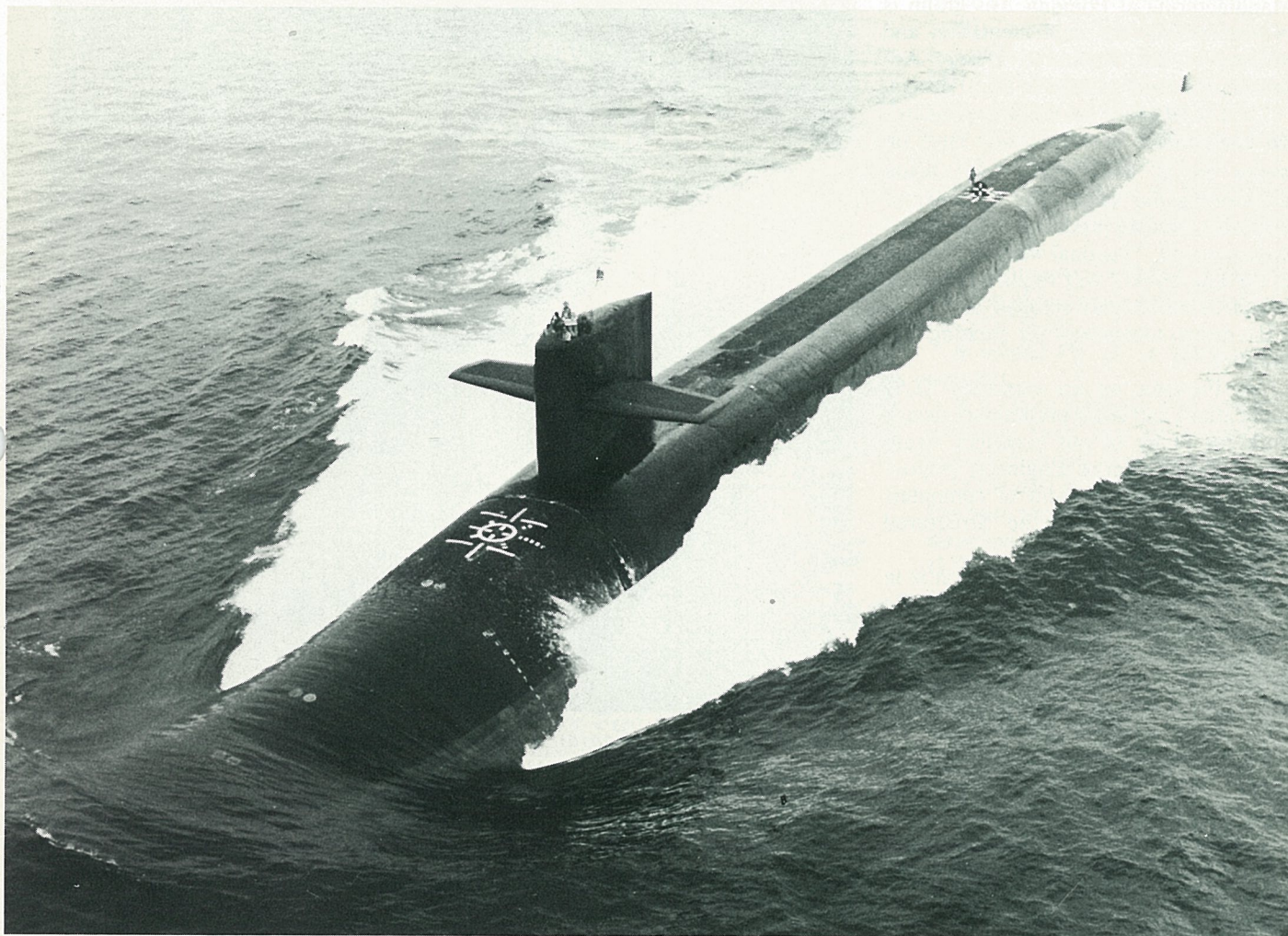
There were several important developments in the high-priority missile and gun system programs at the Pomona and Convair divisions.

Pomona received a \$212.9 million contract from the U.S. Navy for production during 1982 of 75 Phalanx radar-directed shipboard gun defense systems. The Navy also awarded Pomona an \$18 million contract to convert its production line for the Sparrow AIM-7F air-to-air missile to the new monopulse guidance version of the Sparrow, the AIM-7M.

Convair made substantial progress in readying its assembly and checkout facilities for volume production of several versions of the cruise missile for the U.S. Air Force and Navy. In the second quarter of 1981, Convair delivered a total of six fuselages to McDonnell Douglas for the DC-10 commercial transport. This compares with 11 fuselages in the same period of 1980.



Ship Refit. The USS New Jersey approaches the Long Beach (Calif.) Shipyard for refitting with modern weapon systems and components, including General Dynamics missile and gun systems.



Returning Home. The Ohio, Electric Boat's first Trident ballistic missile submarine, returns home from her successful first sea trials. The huge undersea vessel is on schedule for delivery in October.

Josephs to Head GD Productivity Program

Lyman C. Josephs, a 14-year veteran with General Dynamics, has been appointed to the new position of Corporate Vice President-Productivity. Josephs will direct the activities of all GD divisions and subsidiaries in meeting the goals of the recently announced Corporate Productivity Improvement Program.

The program has been established to make productivity gains in an aggressive and well organized manner.

According to Josephs, over the past few years the growth of productivity of General Dynamics has been low:

"Although some divisions have been consistently achieving a positive productivity growth rate, others have been coming in with a negative growth," Josephs said. "We can't allow that negative growth to continue or those divisions will go out of business."

A corporation's productivity is a measure of the value added by its employees to raw materials. Josephs said that one



Lyman C. Josephs

way to calculate productivity is to subtract the cost of raw materials and supplies from corporate sales and then divide the result by the number of employees. Comparing that figure, adjusted for inflation,

from year to year, is an indicator of productivity increase or decline.

"Over the past decade, General Dynamics has made major capital investments in all divisions of the company for the purpose of improving productivity," David S. Lewis, Chairman and Chief Executive Officer, wrote in a memorandum to division managers and subsidiary presidents in announcing the program. "Without question, each of our operations is now better equipped, not only relative to where they were, but also relative to their competition. Our division management is continuing its efforts to better train its people and take advantage of the capabilities of the new equipment to obtain additional gains."

However, Lewis cautioned, "it is now quite evident that we will be unable to make further major productivity gains, nor can we remain competitive unless we make a very major commitment to exploit the opportunities presented by the evolving design and production technology."

"We are all well aware of the strong gains made by Japanese industry through the use of flexible management systems, robotics and, to a lesser extent, Computer-Aided-Design and Computer-Aided-Manufacturing over the past several years. While most of the creative work in these areas was pioneered by American industry, it has been applied far more widely in Japan."

"I am convinced that with our strong position in electronic data processing, electronically controlled machinery and fabrication, and CAD/CAM, that we are particularly well-placed to move out and take advantage of the opportunities these new technological fields make available to us. If we don't, in a very little time we will be right back where we were a dozen years ago."

In his memorandum, Lewis said that each division or subsidiary will be required to set challenging productivity improvement goals. The day-to-day operation of the program in meeting those goals will be directed by Josephs who will be assisted by highly qualified individuals at divisions and subsidiaries "to insure that each operation focuses its attention on the

Continued on Page 4

Ohio, LaJolla Move Toward Delivery to Navy

In early September, sea trials resumed for *Ohio*, the nation's first Trident class submarine and ended for the *LaJolla*, Electric Boat's latest fast-attack nuclear submarine.

The *LaJolla* (SSN 701) returned to the Groton, Conn., shipyard on September 2d. After inspection by the U. S. Navy's Board of Inspection and Survey, she will be delivered. The ship is the fourth 688-class fast-attack submarine to be delivered to the Navy this year.

The Trident submarine, *Ohio* (SSBN 726), was on her third sea trials in early September, and on completion of the trials, she too will be inspected by the Navy's Board of Inspection and Survey prior to delivery.

EB General Manager P. Takis Veliotis has pledged the company's determination to deliver one Trident and six 688-class fast-attack submarines to the Navy this year.

Convair Delivers Flight Vehicle For Guidance Test

The Convair/U. S. Air Force Mid-course Guidance Demonstration has moved a step closer toward its first flight with the delivery of the first flight test vehicle and the instrumentation pod.

Under a \$10.4 million contract from the Air Force Armament Division, Eglin AFB, Fla., Convair will provide flight vehicles, software and instrumentation for tests of three different, lower-cost guidance systems for cruise missiles. The three test vehicles will be based on the Tomahawk cruise missile.

The flight test program is scheduled to begin in October with a test flight of an Unaided Tactical Guidance system.

The other systems to be tested are a Terrain Contour Matching System and Tactical NAVSTAR Satellite update guidance system. A total of 40 captive flights and 18 free flights are planned for the demonstration program.

In each of the flights, the guidance system being tested will be linked to the test vehicle controls using the Digital Integrating Subsystem (DIS), also developed by Convair under contract to the Air Force.

The Air Force is looking for ways to reduce the cost of its missile guidance systems and at the same time improve their reliability. By using a series of small, federated computer subsystems and a single two-wire serial bus, DIS greatly reduces the amount of wiring within a missile. In combination with one of the low-cost guidance systems under test in the demonstration, these cost/reliability goals are expected to be met.

Convair and the Department of Defense officials will be carefully assessing the results of the demonstration for potential applications to other programs, such as the Tomahawk II Medium Range Air-to-Surface Missile.

Pomona Awarded Navy Contracts For \$166 Million

Pomona has received two Standard Missile Guidance and Control Group production contracts totaling \$166.4 million from Naval Sea Systems Command.

One of the contracts, for \$90.9 million, continues production of the extended range version of Standard Missile-2, installed aboard U.S. Navy guided missile cruisers and certain destroyers.

The second contract, for \$75.5 million, is for the production of an upgraded version of Standard Missile-1, Block VI installed aboard destroyers. Included in this contract are missiles that will be delivered to the Australian Navy.

Standard Missile became the U.S. Navy's major surface-to-air weapon system in the late 1960's.

ATC Holds Telephone Sale Exclusively for GD Employees

American Telecommunications Corp. (ATC) is offering almost 11,000 brand new, fully warranted decorator and character telephones exclusively to General Dynamics employees for as little as half the normal wholesale cost.

The telephone companies to whom ATC normally sells its telephones have changed their specifications, which means that ATC cannot sell the previously manufactured telephones commercially without extensive modification.

According to Thomas P. Eisenstadt, ATC's Vice President of Sales, the change involves full modularity vs quarter or half modularity.

Recently, the telephone companies decided that the telephones they sell should have full modularity - be equipped with modular mini-plugs at both ends of the line cord (from the wall to the telephone) and at both ends of the cord from the telephone to the handset.

Prior to that decision, ATC had manufactured telephones with quarter or half

modularity - with a permanently attached handset cord and with mini-plugs at one or both ends of the line cord.

"We can't sell these telephones to our telephone company customers and want to sell them privately to clear our inventory," Eisenstadt says. "These telephones are brand new, in perfect condition and under full warranty."

The telephones which are being offered are ATC's Candlestick®, Empress®, CradlePhone™ and ChestPhone™ decorator telephones, the TeleDialer® and the Winnie-The-Pooh telephone. Some models have rotary dials, some have pushbutton pads and a few can be ordered with either.

Employees interested in purchasing these telephones at the special reduced prices should fill out the order form included in this issue of *GD World* or should contact their Industrial Relations Departments. The sale began in August at Fort Worth and ends when stocks are exhausted or on Dec. 31st, 1981, whichever comes first.

Four GD Units Study Application Of Advanced VLSI Circuit Design

The evolution of advanced tactical weapon system development calls for greater guidance sophistication in less volume and at a lower cost, a challenge that can only be realized by employing Very Large Scale Integration (VLSI) circuits.

"If General Dynamics is to maintain its competitive edge in tactical weapons and other fields, we must develop the capability to design and fabricate custom VLSI circuits for our next generation of products," says Jerry Lockard, Director of Design at Pomona.

"To prepare designers for this challenge, we have begun to develop the necessary computer-aided-design tools and training in custom VLSI design," says Lockard.

Recently, employees from Pomona, Convair, Electronics and Stromberg-Carlson met at Pomona to learn about the new microelectronic design technology that will greatly reduce the size of electronic circuits.

VLSI is an integration of circuit devices which have more than 100,000 transistors. It is a technology which seeks to put as much electronic circuitry as possible into a single package the size of a person's fingertip.

"VLSI using the Structured Design Approach is a state-of-the-art electronics design technology that a very few industries are just now starting to explore," said

Jim Swenson, Manager of Computer-Aided Design and Computer-Aided Manufacturing at Pomona. His group is responsible for the implementation and training of the Structured Design Approach, the method used in VLSI design.

"Every 10 years, the number of electrical components in our circuits must increase by at least eight times while maintaining the same size, in order to keep pace with our product development," Swenson said. "Tactical weapon systems of the late 1980's will require compact, reliable, electronic assemblies, and VLSI is the design technology for creating that circuitry."

"At Pomona, we are exploring VLSI applications and doing preliminary design work for many of our products," said David Smith, Senior Engineer, responsible for the development of computer-aided-design tools for the Structured Design Approach.

An example of VLSI application is in Pomona's Assault Breaker program. "We plan to take one of the 10 three-by-eight inch circuit boards and put its equivalent circuitry on a one-quarter inch square chip using this design technique," Smith said.

Convair is also starting to explore VLSI design possibilities. A team of employees from Convair and Pomona is working with VLSI to redesign a hybrid microelectronic assembly for Convair's cruise missile.

There are many advantages to the new technology. For example, integrated circuits designed using VLSI technology work faster. Electronic signals will travel faster if the length of circuits is shortened. Signals travel considerably faster in a VLSI circuit because they have less distance to cover on a one quarter inch square chip than on a printed circuit board the size of a sheet of typing paper.

Putting more technology into a smaller package also uses lower power consumption and reduces the number of mechanical connectors, thereby eliminating possible failures and minimizing assembly time.

Abilene Receives Contract for F-111 Landing Gear Parts

Abilene Facility began work in August on a \$20 million program that will increase the service life of the landing gears of the U.S. Air Force's F-111s and FB-111s.

Tooling for the F-111 lateral beams, which make up a major portion of the aircraft's landing gear, was recently completed in Fort Worth and shipped to Abilene where the program is expected to run for three-and-one-half years.

The program is the largest single contract job that the Abilene plant, located 150 miles west of Fort Worth, has undertaken. Deliveries of the lateral beams, aluminum support structures weighing about 200 pounds each that connect the aircraft's landing gear axles, are scheduled to begin in January.

AIS Deployment To West Germany Brings Official's Praise

An F-16 Avionics Intermediate Shop (AIS) was recently set up in record time at Hahn AB, West Germany, according to U. S. Air Force officials. The equipment will support activation and flight activities of the first USAF F-16 wing in Europe later this year.

A special airlift mission picked up seven pallets of Electronics Division-built equipment at Fort Worth for the flight to Hahn. Two hours and 35 minutes after the C-141 landed, power was applied to the seven AIS stations.

At the site, an Air Force official commented, "This is the fastest setup of any new shop I have ever seen."

Savings and Stock Investment Values			
Salaried	July 1979	July 1980	July 1981
Government Bonds	\$ 2.1943	\$ 2.4762	\$ 2.6184
Diversified Portfolio	1.4585	1.8771	2.1407
Fixed Income	1.0079	1.1072	1.2274
Hourly			
Government Bonds	2.1947	2.4742	2.6154
Diversified Portfolio	1.4922	1.9151	2.1875
GD Stock	\$16.1250*	\$36.5625*	\$28.7500

*Reflects 2 for 1 stock split of November 1980.



Space Explorer. A Convair-built Centaur high-energy upper stage with a Galileo probe is launched from a Space Shuttle Orbiter in this artist's rendering. The wide-bodied Centaur vehicle designed for use with the Shuttle would be 28 feet long, a little over 14 feet in diameter, and have a capability of boosting up to 14,000 pounds into geosynchronous orbit. Convair is under contract with NASA to design and develop two Centaurs of this type for use with the Shuttle.

Around the World...

...in GD

CHQ: Janis L. Lauricella was promoted to Corporate Office Supervisor-Telecommunications... Howard S. Cooper joined as Auditor.

Convair: H. C. Allison, J. Caldwell and R. S. Dyson were promoted to Operations General Supervisor-Manufacturing... J. K. Ball, J. L. Gardner, R. B. Hutchinson and W. F. Sauer to Project Engineer, Senior... J. M. Bentley and L. F. Wray to Project Engineer... G. M. Chapel, M. S. Fonseca, J. A. Korican, K. R. Krebs, G. E. Wadleigh, A. M. Robbins and E. Liensdorf to Group Engineer... D. J. Clemens, W. E. Herring, T. L. Lamoureux Jr., H. G. Nulton Jr., G. W. Wilcox and B. E. Posey to Chief-Quality Assurance... D. E. Coffee to Administrative Chief... C. J. Cohan, W. G. Hardy and A. R. Horsley to Program Engineering Manager... W. L. Colahan to Quality Assurance Project Administrator... J. A. Crush to Supervisor-Quality Assurance... B. R. Cummings and T. C. Stark to Group Supervisor... J. M. Farnan to Educational Specialist Senior... M. P. Felix to Engineering Director... C. D. Fenstermacher, J. P. Crando and N. E. Hearn to Operations Supervisor-Industrial Engineering... D. G. Huber to Chief-Project Engineer... K. Kaszas and R. K. Simpson to Engineering Manager... N. T. Keith to Chief-Property Administration... F. D. Kuenzel to Engineering Chief... B. P. Long to Estimating Specialist... D. A. McLenachen Sr. to Chief Industrial Engineering... R. S. Ringwald to Program Engineering Chief... T. M. Sammon to Manager-Quality Assurance... M. J. Sinnott to Operations Supervisor-Transportation... P. Smith to Financial Specialist-Senior... R. E. Sommers to Manager, Product Support... A. J. Veitch to Assistant Program Director-Cruise Missile Business.

Electric Boat: Daniel Karns was promoted to Group Trade Planner... David Piver to Chief of Planning & Control... James Smith to Engineering Supervisor.

Electronics: Steven Lopez to Associate Engineer... Belle Onorato to Manager-Employee Relations.

Fort Worth: W. R. Cox, P. L. Graves, R. V. Hall and A. L. Hollis were promoted to Foreman... W. R. Davies, D. M. Rigney, D. R. Sanderlin and J. E. Wetzel Jr. to Field Service Engineer... R. O. Elliott to Field Engineer... R. L. McGuffee to Industrial Engineering Supervisor... J. L. Parris to Engineering Program Manager... B. R. Peters to Engineering Associate-Design... D. B. Rich to Senior Manufacturing Technology Engineer... A. O. Roebuck to Field Operations Supervisor... D. C. Wren to Manager of Procurement... S. J. Short to Engineering Associate-Analytical... James E. Weir transferred from St. Louis and was promoted to Financial Supervisor.

Pomona: D. O. Fickel, R. A. Morrissey Jr. and A. A. Rossman were promoted to Procurement Program Administrator... George F. Stebbins to Project Administrator... Dee A. Showers and Dorothy M. Valdepena to Manufacturing Supervisor.

GDCC: B. E. McMillan transferred from DSD and was promoted to Manager, Management Information Systems... Roger Cannady, Harold Swisher and Theodore Balke were promoted to Regional Operations Manager... Brad Littlehale and Ernest St. Germaine to Regional Manager... James Kienzle to Operations Manager... Raymond Dozzi to Sales Manager... Henry Brawley to Regional Sales Engineer.

Quincy: Richard A. Urenas and Edward G. Gill were promoted to General Foreman-Shipfitting... James Chaney to Superintendent-Shipfitting... James H. Healy to Senior Manager Quality Assurance... John O'Neil to Ship Manager... Richard G. Johnson to Manager-Industrial Labs... Robert J. Adduci to Manager of Inspection... Benito J. Natale to Safety Supervisor... Mavon Jernigan, William A. Jones and Phillip E. Hurt to General Foreman at Charleston... Pete J. Bergeron to Industrial Relations Chief... Maryann Harrington to Executive Assistant.



C. W. 'Smokey' Doyle

'Smokey' Doyle Retires, But His Value Engineering Work Continues

C. W. 'Smokey' Doyle has retired, but the longest sustained value engineering (VE) training program in industry, which he helped start in Fort Worth, will continue.

"As long as it teaches people how to solve problems in an organized, creative way, I can't imagine that value engineering will ever be dropped," said Doyle, who has seen more than 3,300 division employees go through 84 VE training courses during the last two decades.

Doyle, who retired after 30 years with the division, will be succeeded by John D. Jackson. Doyle started the program in 1959 and with his evangelistic zeal has preached the training gospel across the nation and at home since.

And he's going to continue to do so, as a lecturer at the University of Santa Clara in California and at the University of

Wisconsin. It was at the University of Wisconsin where Doyle, working with Professor Fred C. Schwarz, developed the first college VE courses for credit. Since developing that program, Doyle has timed his vacations so he could return annually to the Wisconsin campus to teach.

He's also going to continue spreading the VE word in Fort Worth, where the 85th training course is to begin later this year. "Smokey is like a good old Southern Baptist preacher," said Howard Huggins, who has worked closely with Doyle. "He's full of hellfire and damnation and he gets his message across."

"Value engineering offers the contractor profitability and puts him in a better competitive posture," Doyle said. "The U.S. Government's General Accounting Office and every other agency that has looked into the program agree that value engineering saves money."

"At Fort Worth, where more than 4,600 fighters and bombers have been manufactured for the U.S. Air Force, we have saved hundreds of millions of taxpayers' dollars since we instituted value engineering. . . One thing that I stress is that value engineering is not cost reduction. Value engineering may increase the initial cost, but its impact and savings can be felt during the entire life cycle of the program. That's where its importance lies."

When VE was started, Doyle recalled, the goal was to train 1,000 persons in the methodology. Half of those were to be design engineers, the rest were chosen from other disciplines. "After we achieved that goal, our management was so impressed with the results, the savings were so significant, that we continued the program," he said.

ATC Appoints Two To Regional Sales Management Posts

Two Regional Sales Managers have been appointed by American Telecommunications Corp. (ATC).

Dale Christensen was appointed Western Regional Sales Manager, and Geary S. Corves was appointed Northeastern Regional Sales Manager.

Christensen, prior to joining ATC, had been active in audio and video systems, power supplies and signal data converters, with responsibilities including sales management, technical services and sales engineering.

Corves was previously with Southern New England Telephone, where he had been active in sales, marketing and product management for over 30 years. In addition to an in-depth knowledge of telephone company products and procedures, his background includes market research, forecasting and information services.

MRASM Is Becoming Common Acronym at Convair Division

When the Department of Defense directed development of a tactical medium range air-to-surface missile in late March 1980, Convair's Tomahawk cruise missile was chosen to be the baseline design, and MRASM became another acronym in the conversations at Convair.

A Department of Defense Memorandum for Correspondents a few days later outlined the rationale for the weapon and several of the reasons for the choice of Tomahawk:

- minimum hardware modifications were required because of the Tomahawk's modular design;
- availability of an existing production line
- existing airframe components were available from the air-launched cruise missile program competition.

In the past year, the MRASM program has been proceeding at Convair under the direction of Dr. Jim Karam. A prototype U.S. Navy version has undergone carrier handling tests to make certain that it can be handled and moved aboard aircraft carriers. Other tests verified the capability of a Navy aircraft to perform catapult launches and carrier landings with the missile on its wings. The tests culminated with a captive flight launched from the USS *Kittyhawk*. A typical mission, including four Terrain Contour Matching (TERCOM) updates, was flown to China Lake NAS, Calif.

Since those tests last fall, the program definition studies and development efforts have emphasized the U.S. Air Force version of the missile (AGM-109H), which is designed for airfield attack from B-52 launch platforms.

Other MRASM changes from the basic Tomahawk have been introduced to reduce the cost, including the use of dry wiring, a

federated avionics data bus system that uses the Convair-developed Digital Integrating Subsystem, use of a strapdown inertial guidance system and a change from a turbofan to a turbojet engine.

There are presently two versions of the Tomahawk II MRASM undergoing definition and development study by Convair:

AGM-109H: This will be an airfield attack missile for the Air Force. It will use a modified Teledyne CAE J-402 turbojet engine and will have a strapdown inertial guidance system that uses TERCOM and Digital Scene Matching Area Correlation (DSMAC) updates. The warhead will have runway-cratering submunitions that are designed to deny an enemy the use of an airfield.

AGM-109I: This is a dual-mission missile for the Navy. It will have a large high explosive unitary warhead that will be usable for both anti-ship and land attack roles. It will use the same Teledyne turbojet engine, strapdown inertial guidance and TERCOM correlation as the AGM-109H and will have both imaging infrared and DSMAC for terminal accuracy.

A sea-lane control capability for the Air Force is also being studied.

All of the MRASM variants will have a range of approximately 250 nautical miles. The Navy version will be 16 feet long to fit aircraft carrier weapons elevators; the Air Force versions are to be 19.6 feet long.

The preliminary full-scale engineering development effort for MRASM began in July 1980. A follow-on full scale engineering development contract is expected this summer or fall with first flight tests scheduled for late 1982. MRASM production deliveries are expected to start in 1985.

Shipment of Final CROSSREED Ends Successful Product Line

In early September, 12 years and 2,500 systems after the first Stromberg-Carlson CROSSREED® electronic PABX was introduced, the last CROSSREED was being readied for shipment.

The first CROSSREED was a 200-line Electronic Private Automatic Branch Exchange (EPABX) that Stromberg-Carlson built for the Western Reserve Telephone Co. in Hudson, Ohio. The final system is an EPABX-800, wired for 300 lines, destined for the Jerusalem House Hotel in Amman, Jordan.

Between those two shipments CROSSREED EPABX-400(A), -800 and -1600 Systems have blanketed the country and been installed in many locations overseas.

"Outside of the Bell System, the Stromberg-Carlson CROSSREED installed base is one of the largest of any domestic manufacturer," says James W. Myers,

Analog Product Manager at Stromberg's Public Switching Center in Sanford, Fla. "Not only has the CROSSREED System penetrated domestic business, but it has also been successful internationally and with the government."

CROSSREED Systems offered speed, versatility and compactness with low maintenance compared with conventional switching systems.

When CROSSREED Systems were introduced, advertising called them the "Defuser" of "tomorrow's telecommunications explosion." They had a long projected life and were easy to maintain.

Said Myers, "the CROSSREED System's success over the years can be attributed to its flexible size range, complete hotel/motel features, specialized business features and features for government applications."

Fort Worth Machine Center Production, Quality Increase

A "magnificent team effort" has resulted in substantially increased productivity and quality this year in Fort Worth's numerically controlled machine center, according to Superintendent Ron Westlake.

The effort involved persons from several departments and disciplines, including: fabrication control, programming, maintenance, training and management development, quality assurance, transportation and facilities modernization, as well as the machine operators and supervisors.

The rate of production for the hundreds of different parts manufactured in the numerically controlled machine center has increased more than 23 percent since January 30th when a concerted drive was begun to step it up. During that time, the quality acceptance rate has jumped even higher - 29 percent.

Parts manufactured on the three, four and five-axis profilers and on the other

machining centers range in size from some as small as a charm on a woman's bracelet to aircraft bulkheads that are five feet long and three feet wide.

"In the past, we have been able to increase our production, but it sometimes was at the expense of quality," Westlake said. "Now, we have been able to merge the two successfully. We intend to keep both production and quality at these high levels."

The production rate being achieved at the division - now at the targeted goal of 58 percent - far exceeds the aerospace industry average of less than 29 percent. The production rate, that is when machines are working on a particular part, was at 47 percent in late January. While the theoretical rate of production for a machine would be 100 percent, production time lost for program, tool and parts changing, maintenance and other factors puts the maximum attainable in the 60 to 65 percent range.

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500th F-16 Fighting Falcon's Delivery Marks Milestone

The 500th F-16 fighter produced by General Dynamics and its coproducers in Europe was delivered to the U.S. Air Force at Fort Worth.

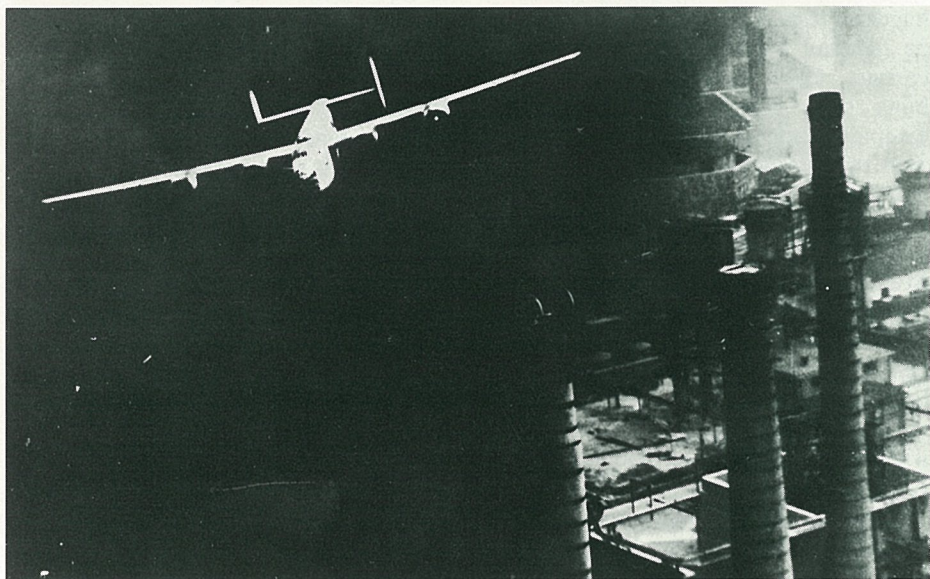
The milestone aircraft, a single seat, multimission fighter, was the 294th Fighting Falcon delivered to the Air Force. F-16s manufactured at Fort Worth and at the two assembly lines in Europe, currently are flying with the Belgian, Danish, Dutch, Norwegian, Israeli and U.S. Air Forces. The U.S. Government has approved the sale of 40 F-16s to Egypt, with the first deliveries scheduled for early next year, and Congress has been notified of the Administration's intent to sell 36 of the advanced aircraft to the Republic of Korea Air Force.

The 500th F-16 is a product of the largest international military coproduc-

tion program in the world. The forward fuselage of the aircraft was manufactured and assembled at Fort Worth, the Fokker company in the Netherlands manufactured and assembled the center fuselage, and two Belgian companies, Sonaca and Sabca, assembled and delivered the aft fuselage and wings, respectively. Final assembly and USAF acceptance was at Fort Worth.

Following a brief ceremony that was attended by, among others, Herbert F. Rogers, Vice President and General Manager of Fort Worth, and Brig. Gen. George L. Monahan Jr., Air Force F-16 Program Director, the 500th aircraft was one of eight ferried to the 8th Tactical Fighter Wing at Kunsan AB, South Korea.

GD Flashback



A B-24 Liberator over Ploesti

World War II's B-24 Liberator Was General Dynamics 'Best Seller'

Over the years, General Dynamics has produced a wide variety of successful products, but one stands out above all the rest as the company's best seller.

The product was the B-24 Liberator, the squat and dumpy but magnificent World War II bomber.

By the end of the war, Convair workers had turned out 9,760 Liberators in many versions. Of these, 6,726 were built in San Diego and 3,034 were built in Fort Worth. But if the Liberators produced by subcontractors (Douglas, Ford and North American) are included, the total is a staggering 18,479.

Fort Worth Division owes its birth to the insatiable wartime demand for the bomber, which could carry a load of 5,000 pounds of bombs 3,000 miles, at a speed of almost 300 miles an hour at an altitude of 30,000 feet.

The B-24's history began in January 1939, when Army Air Corps Maj. Gen. Henry 'Hap' Arnold asked Consolidated Aircraft Co. to design a strategic bomber that could "fly the skin off any rivals." The company made an amazing response. In less than a year, the San Diego-built XB-24 made its maiden flight, and the B-24 went on to become the most heavily produced four-engine aircraft of the war.

From the onset, demand reached such proportions that despite the fact that subcontractors were selected to build the airplane, additional production space was necessary. Ground was broken for a government-built B-24 plant at Fort Worth in April 1941, and the first Fort Worth-built B-24 was accepted by the U.S. Army Air Forces in May 1942, 100 days ahead of schedule.

By that time, the Liberator's reputation was well established. In late 1940, an English aviation writer called it "the best military aeroplane ever built in America." The British, who usually called it the LB-30 (Land Bomber, design No. 30), flew the Liberator in support of the North

African campaign against Rommel and on anti-submarine patrols over the Atlantic.

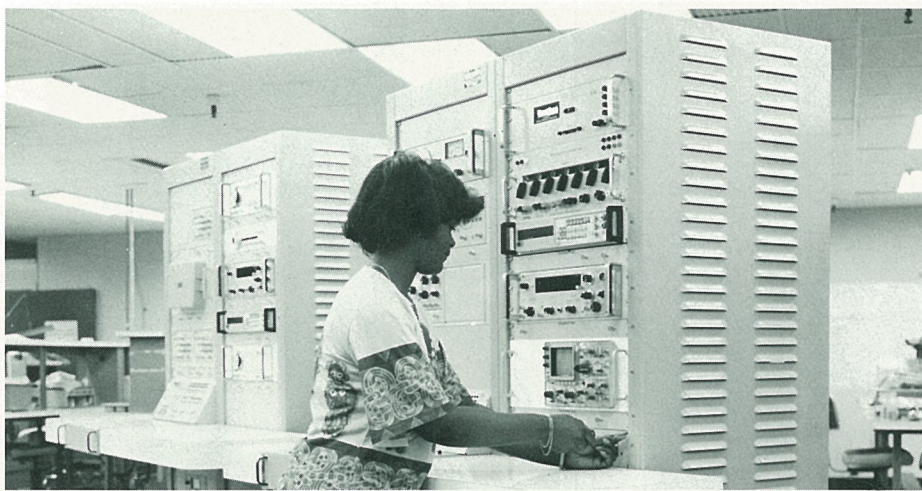
The U.S. Eighth Air Force flew B-24s from England to France in 1942 and deep into Germany in 1943. B-24s also led the first bombing raid through flak-filled skies to open the decisive air battle over Berlin. Later, American B-24s were there in waves on D-Day, bombing the invasion beaches in pre-dawn darkness.

B-24s pounded just about every important target in Europe, but their most spectacular and most costly mission was the second attack on the oil fields and refineries at Ploesti, Rumania, in August 1943. Aircraft from the Eighth and Ninth Air Forces put on an all-Liberator show. They faced murderous antiaircraft fire on their low-level attack on the heavily defended targets. The cost of the 2,700-mile roundtrip mission from Libya was high. The attackers lost 54 of their 177 planes while knocking out more than 40 percent of the refineries' capacity. Five Ploesti aircrewmembers received the Medal of Honor for that single mission.

In the Pacific, Liberators gradually took over from the B-17 as the workhorse heavy bomber, largely because of their extensive range. For most of the early years of the war, the B-24 and its Navy counterpart, the PB4Y Privateer, were the only American heavy bombers covering the seas from Alaska to India. The Privateer, a modified B-24 with a single, tall vertical tail, was generally considered the Navy's most deadly bomber.

Two other versions of the Liberator, the C-87 Liberator Express personnel-cargo transport and the C-109 Flying Tanker, helped make history "flying the Hump" in the China-Burma-India theater of operations.

The B-24 has not received as much public acclaim as the B-17 Flying Fortress, but it was one of the great planes of World War II, and its crews usually considered it a good and faithful servant.



Ahead of Schedule. Gloria Woods, an electro-mechanical technician at Electronics, tightens the final panel on a Special Test Equipment unit which will be installed in the F-16 Depot Level Maintenance Facility being established at the division.

Special F-16 Test Equipment Produced Ahead of Schedule

Nearly half of the Special Test Equipment stations that will temporarily support depot level maintenance of the F-16 Avionics Intermediate Shops (AIS) around the world have been completed and tested at Electronics Division.

These stations, part of a 15-station Depot Level Maintenance Facility to be established at the division, are being produced on an accelerated schedule and have completed testing approximately six months ahead of the original plan.

This in-plant Depot Level Maintenance

Facility will be used until the U.S. Air Force in-house capability is established, at which time items will be sent to the Air Force repair facility and the division's facility will be phased out.

The depot Special Test Equipment will consist of 15 test stations of six different configurations with 109 test adapters. This will allow Electronics to troubleshoot and test the printed circuit boards and replaceable units in the F-16 AIS shops that the division manufactures.

GD Cited for Initiatives, Programs In Accommodating for the Disabled

The U.S. Council for the International Year of Disabled Persons (IYDP) has recognized General Dynamics for its "initiatives and programs." In a letter to David S. Lewis, Chairman and Chief Executive Officer, the council said General Dynamics has "helped to increase understanding of the potential of disabled persons and to accelerate progress toward their full participation in American life."

"General Dynamics recognizes it has a responsibility to handicapped and disabled persons," says David Lavalette, Corporate Director of Safety and Environmental Health and the company's liaison

with the IYDP organization. He also maintains and makes available a repository of information for accommodating disabled employees.

Lavalette says the corporation has a policy to hire, train and promote handicapped and disabled persons and will make accommodations in plant and procedures where practicable to ensure handicapped or disabled persons have access to jobs.

For example, Lavalette says, physical changes are made every year to General Dynamics facilities to adapt them for the handicapped. Special ramps are installed for wheelchairs, work station modifications are made, and special telephones are provided for the hard of hearing. Rest room modifications have been made where needed, and specially located public telephones have been provided.

"I can't say enough for what has been done for me," says Tommy Cook, a telephone operator at Electric Boat who suffered polio when he was a child. A 39-year veteran at EB, Cook says, "Electric Boat really opened its door for me; if it hadn't I wouldn't be here."

Robert L. McMahon Jr., says, "Fort Worth management had to waive the physical requirements for me just to get inside the door."

McMahon, who started as a programming trainee and is now a Chief in the Manufacturing Technology Department, suffered polio when he was eight.

"I was hired in 1967, before hiring the handicapped was federally mandated," he said. "I've got to give the corporation credit - it's been very good to me."

Bill Black, a seven-year veteran with Stromberg-Carlson, has been confined to a wheelchair since 1967. He started his career at Stromberg-Carlson removing parts from printed wiring boards. He has progressed to test technician and to Quality Control Inspector of printed circuit boards.

"Stromberg-Carlson has treated me well," he says. "It has provided me real opportunities in electronics and has everything I need to do a good job and make a good living. I don't think I could work for a better company."

According to Lavalette, the company's commitment to increased utilization of disabled employees will be promoted through an exchange of handicapped accommodation experience among corporatewide representatives at a conference to be held at Fort Worth in September.

Josephs Named Productivity VP

Continued from Page 1

program and . . . is able to obtain suitable priorities for its projects."

Josephs, who has been Corporate Vice President-International since 1976, said, "Some people think improving productivity means there will be fewer jobs available - it can mean that if your output remains the same.

"But in this highly competitive world, productivity improvement is a way of saving employees' jobs, because if you can produce more with the same number of people, you'll be in a good position compared with your competition.

"If you slide into the position where you are producing less than your competition, you won't be in business very long."

Josephs has been with General Dynamics since 1967, when he joined Convair as Director of Advanced Programs. In 1970, he was named Vice President and Convair General Manager. The next year, he was named Vice President-Long Range Planning for both Fort Worth and Convair. He became Vice President - Director of Lightweight Fighter Program, now the F-16, and was later named Deputy General Manager of Fort Worth in addition to his duties as Vice President - F-16.

He began his business career in 1946 with Chance Vought Aircraft where he progressed from Assistant Project Engineer to Program Director. In 1965, Josephs was Director-Aircraft Development for the Martin Company Division of Martin Marietta Corp.

Josephs holds a Bachelor of Science degree from Harvard University and has completed the advanced management program of the Harvard Graduate School of Business.

R. E. Adams and J.R. Mellor Elected to Board of Directors

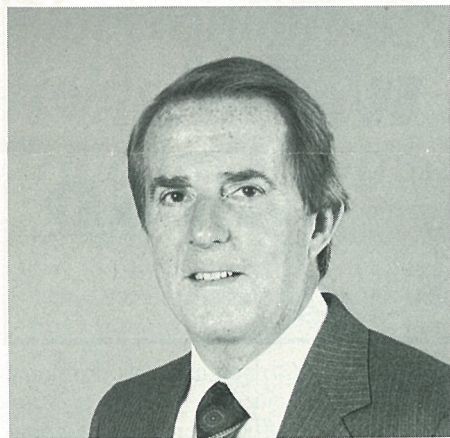
Richard E. Adams and James R. Mellor have been elected to the General Dynamics Board of Directors. Mellor was also elected to the position of Executive Vice President-Commercial Systems and Corporate Planning.

David S. Lewis, Chairman and Chief Executive Officer, said Mellor will be responsible for the company's strategic planning and for several of the company's commercial subsidiaries, including American Telecommunications Corp.; Asbestos Corporation Ltd.; Data-graphiX, Inc.; General Dynamics Communications Company and Stromberg-Carlson Corp.

Mellor joins General Dynamics from AM International, Inc., where he had



Richard E. Adams



James R. Mellor

served as President and Chief Operating Officer since 1977.

Adams was named the company's Executive Vice President-Aerospace in July 1981. He previously had served for 10 years as Vice President and General Manager of Fort Worth Division. He has been a Corporate Vice President since 1974.

A native of Springfield, Ohio, Adams was graduated from Purdue University in 1942 with a Bachelor of Science degree in Mechanical Engineering. He joined General Dynamics at Fort Worth in 1951 as an Assistant Project Engineer and held a number of increasingly responsible engineering and design positions at the division. In 1970, he was named Vice President of Engineering at Convair.

Mellor, a native of Detroit, Mich., was graduated from the University of Michigan in 1952 with a Bachelor of Science degree in Electrical Engineering and Mathematics and was awarded a Master of Science degree from the same university in 1953.

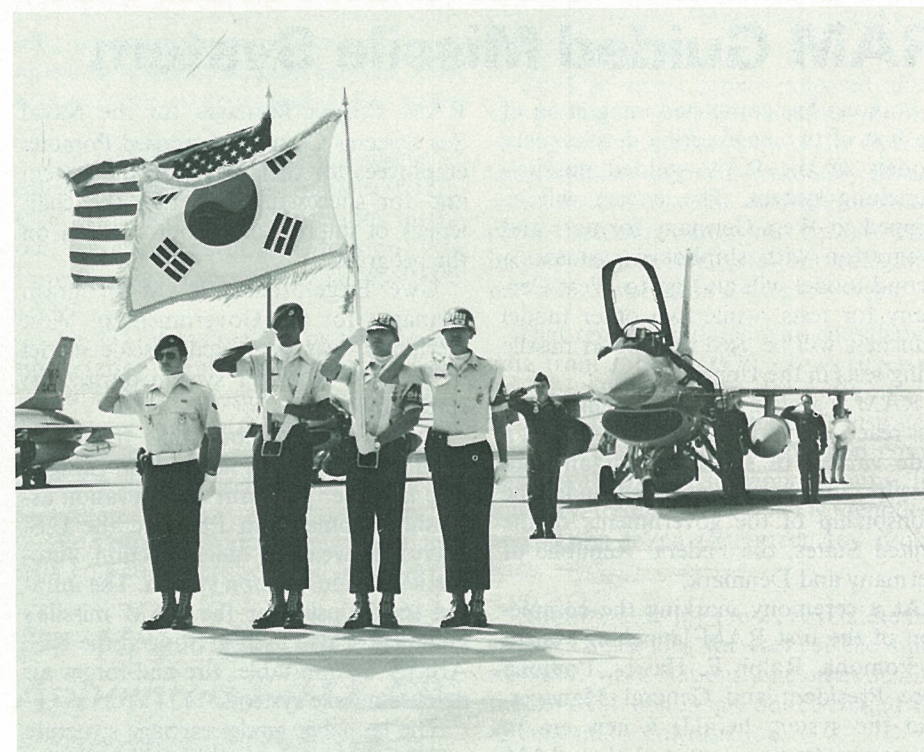
He began his industrial career with Hughes Aircraft in 1955 as a Research Engineer, after two years of military service as an officer with the U.S. Army Signal Corps. While at Hughes, he also served as a Program Manager in the Ground Systems Group.

Mellor joined Litton Industries, Inc. in 1958, and during the 18 years he served with that company, held increasingly responsible engineering, program management and executive positions in data systems, communications and electronic data systems, and defense and commercial systems operations.

He was named a Corporate Vice President of Litton and President of the Data Systems Division in 1968, and was appointed Senior Vice President, Communications and Electronic Data Systems Group, in 1971. From 1973 to 1977, he headed the Defense and Commercial Systems Group and was named Corporate Executive Vice President in 1976.



Destination Korea. F-16s enroute to Kunsan AB, Republic of Korea, the first overseas F-16 Fighting Falcon base of the U.S. Air Force. During the arrival ceremony (below), pilots and ground crews of the 8th Tactical Fighter Wing salute the colors.



Ohio Completes Final Trials; October Delivery Scheduled

Electric Boat will deliver the nation's first Trident ballistic missile submarine, *Ohio* (SSBN 726), to the U.S. Navy by the end of October — a major milestone for the shipyard and for the Navy's program to deploy new submarine-launched strategic missile systems.

The 560-foot long vessel successfully completed her final sea trials on October 17th.

Meanwhile, EB's third Trident, *Florida* (SSBN 728), is scheduled for launching on November 14th.

"The lead Trident has had a highly successful series of sea trials which have exceeded our expectations," Secretary of Defense Caspar W. Weinberger told the House Armed Services Committee on October 6th. In his testimony covering the Administration's plans to strengthen the nation's strategic force, Weinberger said the submarine-launched missile leg of the Strategic Triad is "in many ways the most survivable of all systems." He said that Trident submarine construction would continue "at a steady rate of one per year."

A virtually undetectable undersea missile-launching platform, the *Ohio* class of submarine incorporates the latest state-of-the-art technology and carries 24 Trident I intercontinental ballistic missiles,

each with eight independently targeted reentry vehicles.

To increase the potency of the submarine-launched missile force, Weinberger told the committee, the Administration plans to develop a more accurate version of the missile, the D-5 or Trident II.

The new missile, Weinberger said, nearly doubles the payload of its predecessor and is more accurate.

With the new missile, the United States can maintain its submarine-based strategic capabilities when large numbers of older Poseidon submarines retire in the 1990s. "At the same time, we provide the additional targeting capabilities that come with a more accurate missile," Weinberger said.

LaJolla Delivered

Electric Boat delivered the 688-class submarine *LaJolla* (SSN 701) to the U.S. Navy on September 30th. It became the fourth fast-attack submarine to be delivered by EB this year.

Earlier in 1981, the shipyard delivered the USS *Bremerton* (SSN 698), USS *Jacksonville* (SSN 699) and USS *Dallas* (SSN 700). Two more are scheduled for delivery by the end of the year — *Phoenix* (SSN 702), now undergoing sea trials, and *Boston* (SSN 703).

Fighting Falcons Operational With Pacific Air Forces in Korea

Kunsan AB, South Korea, has become the first overseas base at which USAF F-16 Fighting Falcons have been assigned.

The event was marked by a ceremony attended by government and military officials of Korea and the United States which was highlighted with the arrival of seven F-16s that completed a three-stop, 8,500-mile ferry flight from Fort Worth.

During the ceremony, U.S. Ambassador Richard L. Walker said that the high technology Fighting Falcon will dramatically improve U.S.-Korean defense capacity.

"The deployment of U.S. Air Force F-16s to Korea represents a dramatic improvement in our combined defense posture," the ambassador said. "It symbolizes the determination of the United States to make certain that our combined deterrent and defense posture on this peninsula reflects technological advances in weapons systems."

The ceremony marking Kunsan's activation as an F-16 base was described as a "milestone in our security posture in the western Pacific," by U.S. Army Gen. John A. Wickham Jr., Commander-in-Chief, Republic of Korea/United States Combined Forces Command.

"The arrival of the F-16 aircraft improves our combined forces and defense capabilities," Wickham said. "Our mission here is peace, but we recognize that the best way to prevent war is to be fully prepared for it."

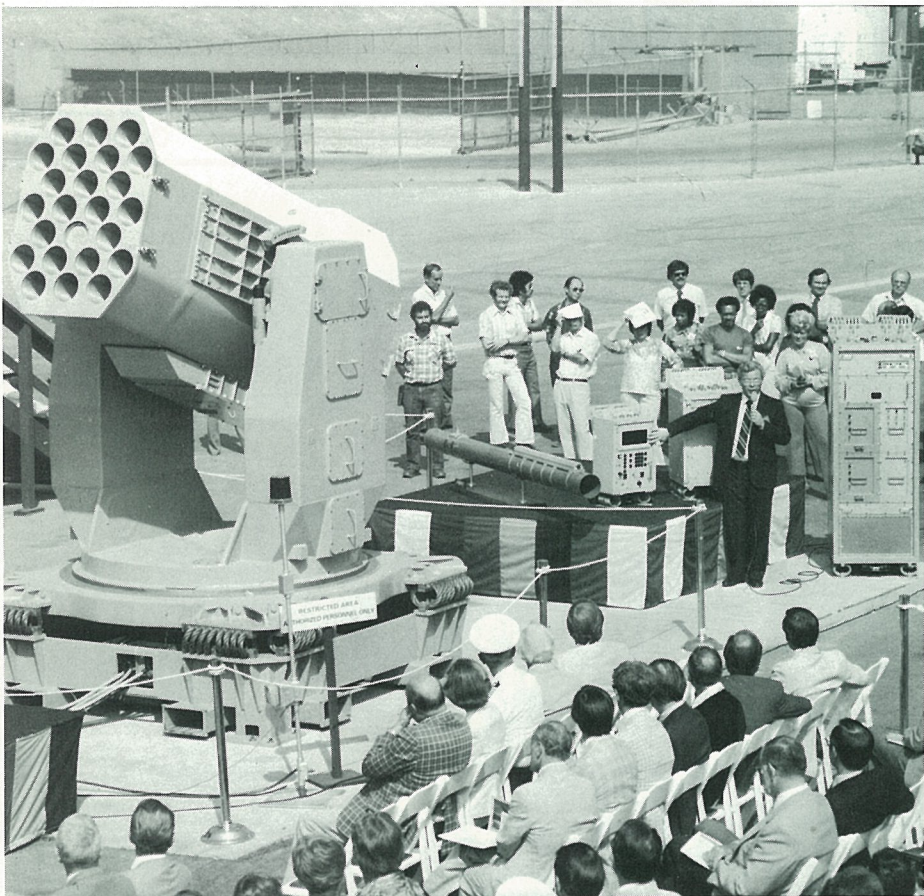
Gen. Yoon Sung Min, Chairman of the Joint Chiefs of Staff, Republic of Korea, said that the arrival of "these mighty F-16 fighters . . . surely demonstrates the firm resolve of the United States for the defense of Korea."

U.S. Air Force Lt. Gen. Charles L. Donnelly Jr., Commander of U.S. Forces, Japan and Fifth Air Force, said "There is no question that it is one of the finest fighters ever built in the world."

The first F-16 to land during the ceremony was piloted by U.S. Air Force Col. Donald Snyder, Commander of the 8th TFW.

"We've always had the people to get the job done," the colonel said. "With the added capabilities of the F-16 and the talents of our people, I have no doubt we'll remain the best fighter wing in the world."

Within a few days of the ceremony, eight more F-16s arrived at the base, which is the home of the 8th Tactical Fighter Wing (TFW), the "Wolf Pack." The F-16s are replacing the Wolf Pack's F-4 Phantom II aircraft.



New Weapon. More than 1,700 employees and guests attended a ceremony marking completion of the first engineering model of the RAM launching system at Pomona on September 22d. During the program, T.H. Tennant (on platform), RAM Program Manager, described the various components of the system.

Model Launcher Delivered For RAM Guided Missile System

Pomona has completed integration of the first of two engineering development models of the RAM guided missile's launching system. The system will be shipped to West Germany for tests and integration with shipboard systems; a second model will also go to West Germany for tests, while two other model launchers will be used to support missile firing tests in the United States.

RAM is a high firepower, lightweight, fast reaction system designed to defend a wide variety of ships against antiship missiles. It is being developed under the sponsorship of the governments of the United States, the Federal Republic of Germany and Denmark.

At a ceremony marking the completion of the first RAM launching system at Pomona, Ralph E. Hawes, Pomona Vice President and General Manager, said the system heralds a new era in weaponry development and that RAM would provide a new defense capability during naval engagements.

U.S. Navy Capt. C.E. Heckathorn,

Boileau Honored By Univ. of Penn.

General Dynamics President Oliver C. Boileau has been honored by his alma mater, the University of Pennsylvania. Boileau has been selected to be part of the gallery of distinguished engineering alumni.

The gallery was established in 1975 by the university's School of Engineering and Applied Science to honor graduates who have made significant contributions to society in their careers.

Boileau was graduated with a bachelor's degree from the university's Moore School of Electrical Engineering in 1951 and received his master's degree in electrical engineering from the same school in 1953.

RAM Project Manager for the Naval Sea Systems Command, praised Pomona employees for their work on the system and for successfully meeting the challenges of international coproduction on the program.

Uwe Engelbrecht, RAM Program Manager for the Government of West Germany, was presented a scale model of the first launcher system during the ceremony.

RAM utilizes subsystems from two Pomona products, Phalanx and Stinger. The launcher platform and elevation assemblies come from Phalanx, the U.S. Navy's all weather, quick-reaction, automatic close-in weapon system. The infrared seeker used for the RAM missile's guidance is also used in Stinger, the U.S. Army's manportable, fire-and-forget air defense missile system.

The launcher guide, carriage structure and launcher servo cabinet assembly are fabricated in Germany. Firms participating in full scale engineering development include AEG-Telefunken, Bodenseewerk, Diehl, Estel Rothe Erde, and VFW.

The Navy awarded Pomona an \$85 million contract in June 1979 for full-scale engineering development, including fabrication of prototype command and launch systems, engineering model missiles and limited production rounds for flight tests and evaluation.

As work by Pomona and the German firms progresses, tests have been conducted at White Sands Missile Range, N.M. In September 1980, RAM was successfully launched from a fiberglass canister demonstrating that the canister is able to withstand heat and structural forces resulting from the firing and that the canister imparts the desired roll rate to the missile.

During tests in August and September of 1981, RAM missiles successfully intercepted remotely controlled aircraft simulating antiship missiles.

Air Force Program Director Congratulates F-16 Industry Team on 500th Delivery



15 September 1981

Mr David S. Lewis
Chairman
General Dynamics Corporation
St Louis, Missouri

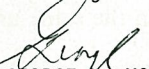
Dear Dave

I recently had the great pleasure of accepting the 500th production model F-16. It was delivered ahead of schedule, was well within cost guidelines, met or exceeded performance requirements, and contained components coproduced in several countries. The cost, schedule and performance criteria were established seven years ago this month.

Considering the scope and magnitude of the F-16 program, I view this as an extraordinary achievement. The F-16 team includes hundreds of industrial firms and thousands of people in five coproducing countries. General Dynamics, as the prime contractor, is the industrial leader of that team and is ultimately responsible for program execution. It is with great pride, therefore, that I extend my congratulations to you and the industrial team and to the many thousands of people worldwide who have served on that team. I would appreciate if you would pass my congratulations on to them.

The 500th airplane represents a great start. We still have a long way to go, but the program is alive and very healthy and I anticipate continued success. I am looking forward to it and our continued close association.

Warm Regards


GEORGE L. MONAHAN, JR
Brigadier General, USAF
System Program Director
Deputy for F-16

Around the World... ...in GD

CHQ: William S. Harlow transferred from Stromberg-Carlson and was promoted to Corporate Financial Analyst . . . Eugene N. Sterling joined as Corporate Manager, Tactical Systems . . . Ellen F. Ross as Corporate Office Personnel Administrator . . . Sue L. Shike as Corporate College Relations Administrator . . . Richard A. Smith as Staff Specialist Corporate-Wide Application . . . Michael B. Veal was promoted to Corporate Manager, San Antonio Office.

Pomona: Venita G. Harrington was promoted to Project Representative . . . Michael V. Rossman to Procurement Program Administrator . . . John M. Armstead to Senior Buyer . . . Lloyd K. Evans to Project Engineer . . . Richard D. Jones to Material Control Supervisor . . . Walter D. Lee to Purchasing Agent . . . James W. Rose to Quality Control Engineer, Sr. . . . Robert J. Carr to Design Engineer, Sr. . . . Harold W. Heitz to Technical Buyer . . . Roger D. Lober and Ronald D. Rheude to Chief, Cost Control.

Fort Worth: J. E. Bartkowiak was promoted to Logistics Engineer . . . B. M. Boaz and W. L. Boddie to Project Manager . . . R. A. Cook to Industrial Engineer . . . G. M. Croy to Manufacturing Technology Supervisor . . . G. L. Davis to Director-Electronic Products . . . L. R. Dingle to Manufacturing Technology Engineer, Sr. . . . J. Duncan and L. S. Herring to Logistics Engineer, Sr. . . . R. E. Griffin to Chief of Quality Assurance . . . R. J. Grona and W. F. Roy to General Foreman . . . C. E. Howard to Tool Manufacturing General Foreman . . . C. E. Hubert and C. R. McDaniel Jr. to Industrial Engineering Specialist . . . C. D. Ingram to Manufacturing Director . . . L. A. Johnson and W. B. Roberson to Financial Supervisor . . . J. D. Jackson Jr. to Manager of Cost Reduction . . . W. Keith to Field Operations Manager . . . W. N. Keith to Quality Assurance General Supervisor . . . W. C. MacDonald to Contract Proposal Estimator . . . M. R. McCoy to Manufacturing Control General Supervisor . . . W. T. Montgomery to Foreman . . . J. N. Olhausen Jr. to Marketing Specialist . . . B. R. Plumlee to Manufacturing-Director . . . F. E. Riney to Director of Estimate-Cost Analysis . . . C. R. Seagle to Program Analyst, Sr. . . . W. Warren to Manager of Accounting . . . R. T. Yaggi to Chief/Industrial Engineering.

Convair: Alvin D. Bush was promoted to Logistics Specialist, Sr. . . . Francis A. Hepburn to Engineering Specialist-Plant Engineering . . . William R. Harger and Gary S. Kruse to Engineering Manager . . . Joan Manuel to Configuration Management Analyst, Sr.

Electric Boat: Harry Duval was promoted to Engineering Supervisor . . . Christopher Fake to Engineer . . . William Martin to General Foreman . . . Thomas Valenti to Area Superintendent-Quonset Point . . . Scott Waring to Senior Supervisor Quality Assurance . . . Michael Bates to Change Control Supervisor . . . Andrew Kingman to Nuclear Test Supervisor.

GDCC James Mihalik was promoted to Sales Manager . . . Louis B. Olender to Engineering Manager, Product Management . . . David H. Bagley to Operations Manager . . . Wayne H. Luttner to Account Manager.

DSD: L. Z. Gaska was promoted to Software Design Specialist at the Western Data Systems Center.

Savings And Stock Investment Values			
Salaried	Aug. 1979	Aug. 1980	Aug. 1981
Government Bonds	\$ 2.2214	\$ 2.4357	\$ 2.6163
Diversified Portfolio	1.5843	1.9194	2.0366
Fixed Income	1.0235	1.1167	1.2385
Hourly			
Government Bonds	\$ 2.2063	\$ 2.4335	\$ 2.6133
Diversified Portfolio	1.5872	1.9580	2.0803
GD Stock	\$22.3750*	\$35.8125*	\$22.8750
* Reflects 2 for 1 stock split of November 1980.			

AF Civilian, Officers Begin EWI Program at Convair

For the first time in 25 years, an Air Force civilian employee has been selected to receive a year's training under the Air Force's Education with Industry (EWI) program. Previously, only active duty officers have been selected for the training.

Michael B. Ryan, Maj. H. F. Cooper and Capt. J. M. Volpe reported to Convair on September 8th to begin a 10-month training program in industrial management. During their assignment, they will spend a portion of their time visiting the various departments of the division and then will spend approximately 32 weeks in specific job assignments as management trainees.

Ryan, the first civilian Air Force employee to be assigned as a student in the EWI program, comes to Convair from Wright-Patterson AFB, Ohio, where for the last three years he has been assigned to the Field Activities Branch of Headquarters, Air Force Contract Maintenance Center (AFCMC), Air Force Logistics Command. In this job, he has been responsible for identification of Foreign Military Sales programs that required Contract Administration Services and for establishing of AFCMC offices in the foreign locations.

Maj. Cooper was last assigned as Chief of Social Actions at Hahn AB, West Germany, where he was responsible for social actions programs that included equal opportunity, drug and alcohol abuse, human relations education and cultural/ethnic awareness. Cooper entered the Air Force in 1968 and was promoted to major in August 1980.

Electronics Helps Build Training Range

An Electronics Division instrumented range system, which will enable the U.S. Army to train up to battalion-size units, is being built for installation at the U.S. Army's National Training Center at Fort Irwin, Calif.

Electronics is teamed with Scientific Applications, Inc., of La Jolla, Calif., as subcontractors to the prime contractor, AMEX System, Inc., of San Diego.

The range will cover over one thousand square miles of California desert with an aerial buffer zone for controlling approaching and departing aircraft. Forces will be able to maneuver and oppose each other on the range, using armored and mechanized infantry units in a realistic battlefield environment.

During the training, information on the position and activities of up to 500 participants can be forwarded to a centralized control and analysis facility, and the action can be monitored as it actually happens. The information will be recorded and stored at the analysis facility and be available for playback and review by the participants. More than 300 ground vehicles, 20 air defense units, 30 helicopters, 20 high performance aircraft and more than 100 individual troops can be instrumented to participate in each exercise.

The major equipment provided by Electronics will include the tracking and communications, computational and player unit components. The system is based on Electronics Division's successful Range Measurement Systems previously installed at six Army and U.S. Air Force test and training ranges.

Capt. Volpe will find San Diego's climate a considerable change from his last assignment — Minot AFB, N.D. At Minot, he was Maintenance Supervisor for the 91st Field Missile Maintenance Squadron and was previously in charge of scheduling control for the missile wing at Minot. He was a Minuteman Combat Crew Commander at F.E. Warren AFB, Wyo., for four years, including two years as an instructor in the Minuteman III missile system.

Convair Employees Awarded \$3,000 For Suggestions

Two Convair employees are richer for suggestions they made in the division's Cost Reduction Program. T.J. Davis, a designer in Cruise Missile Structural Design, was awarded \$2,185 for his suggestion, and A.E. Adler, an air conditioning and refrigeration mechanic, earned \$1,074, including a \$215 energy savings bonus.

Davis suggested that engineering drawings requiring matching hole patterns be dimensioned in accordance with American National Standards Institute Standard 14.5, which details industry methods of dimensioning drawings. The previous method called for drawings with matching hole patterns to have a notation "To Match," which also required the tool number to be referenced. The company was then required to provide the tool hardware and supporting drawings.

The introduction of Numerical Control (NC) machining meant that these "To Match" notations not only called out NC machine tape numbers but also required tools and tool drawings. By conforming to the ANSI standard, these tools were no longer necessary.

Adler noted that there were 41 air conditioning units that were not connected to the central computer control, but were controlled only by thermostats, regardless of whether or not the area was in use.

By adding timers to the control circuits of these air conditioners, Adler said, the units could be set to operate only during working hours, with calculated savings of more than 120,000 kilowatt-hours per year.

Blackshaw Appointed Vice President For Program Development

George E. Blackshaw has been appointed Vice President-Program Development at Convair. He will be responsible for Advanced Programs and Marketing.

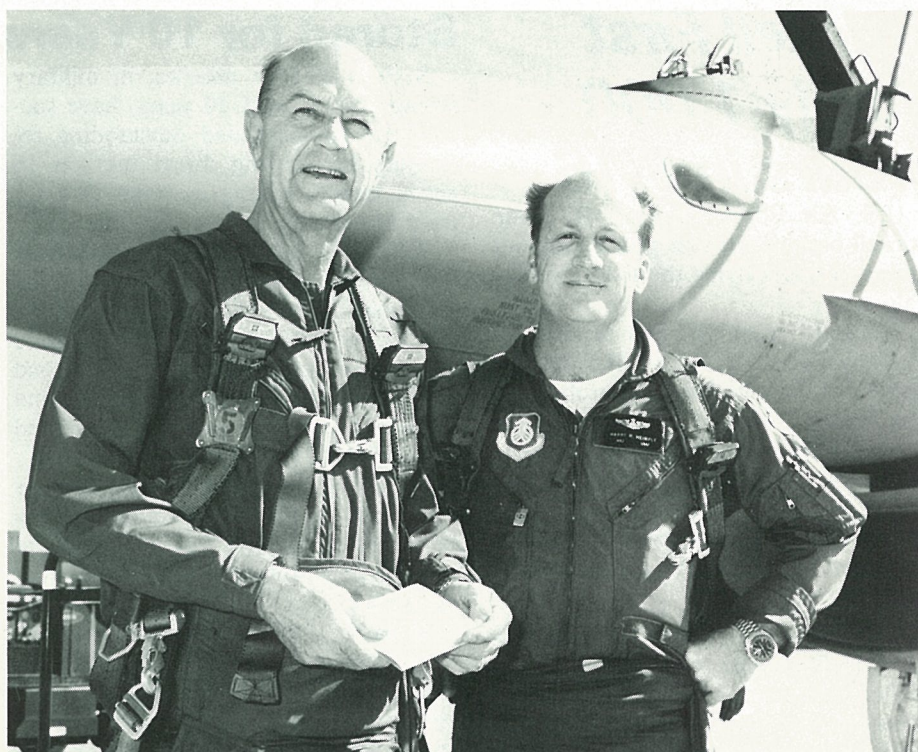
Blackshaw joined General Dynamics in 1978 when he was appointed Vice President-Research and Engineering for Convair.

Prior to coming to Convair, he served for three years as Director for Air Warfare in the Office of the Secretary of Defense. From 1972 until 1975, he was the Technical Director for the U.S. Air Force Armament Laboratory and the Guided Weapons Division at Eglin AFB, Fla. Before that, he served in various engineering assignments at the Marquardt Corporation, Hughes Aircraft Company and the Naval Weapons Center at China Lake, Calif.

DatagraphiX Offers Roll Film Recorders

DatagraphiX has introduced its Model 4570 and Model 4580 roll film microfiche recorders. They are the most recent advancements in the 4500 series of high-production, high-speed minicomputer-controlled computer output microfilm recording systems.

Both models consist of a recorder, stand-alone dual density tape drive, desk unit and electronic data terminal.



First Flight. J. Lynn Helms (left), Director of the Federal Aviation Administration, recently made his first flight in an F-16 Fighting Falcon at Edwards AFB, Calif., with Maj. Harry Heimle.

Computer Drawn Graphics Save Fort Worth Time, Money

Computer drawn charts and graphs, which give Fort Worth management and U.S. Air Force officials numerous periodic operational reports, are being prepared in minutes and for pennies compared to the system used a few years ago.

The new graphics reporting system is called Statistical Trends Graphics (STG). One of its benefits over previous methods is that it saves the division, Air Force and taxpayers more than \$500,000 a year.

The STG is maintained by the Quality Information Center, a section of Fort Worth's Quality Assurance Department. The center was established in 1978 to organize and reduce the voluminous available data to useful management information.

The system provides communications, data collection, retrieval and analysis for

all manufacturing, processing, tooling and test areas. Data is instantly retrievable from on-line, real-time terminals and plotters.

The first major report prepared after the computer graphics system was installed and programmed was the Operations Quality Report, a monthly document that lists total nonconformance costs, including scrap and rework and inspection rejection rates for each department involved in F-16 production.

That report, prepared with cumulative data from January 1979, shows supervisors and foremen the nonconformance cost per unit and graphically illustrates how the past month's production compares with that of previous months. In this way, trends can be quickly identified and action taken to correct any problems.

Another monthly report covers the inspection rejections for each of the sub-assembly work stations; one other details the amount of foreign objects found in aircraft under construction.

"We have the capability of producing a report on each piece of functional equipment that goes in the aircraft," said Charlie Crandall, Chief of the Quality Information Center.

Reports are compiled on the removal rates of line replaceable units, generally vendor-supplied equipment, from the time of installation through the flight acceptance process.

If the removal rate exceeds a specified percent on any item, the computer automatically plots the removal trends and quality history, and a System Quality Specialist is assigned to take steps to reduce the rate to one more acceptable. This system has resulted in removal rates being reduced in 1980 by 50 percent, at significant cost savings.

Additional computerized reports are planned on more than 600 functional F-16 components that have to be removed or adjusted in the field.

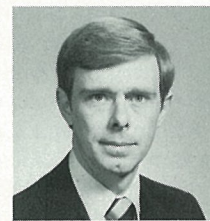
In developing the software for the STG, Crandall said variables were built into the system so that an entire chart or graph or just one item can be instantly retrieved.

"Basically, what we are producing is a quality visibility chart," he said. "With these charts, we can readily and easily draw our improvement curves. They give an easy to read picture of the trends."

The average quality summary report for a department, which can be printed on a single sheet of 8½-by-11-inch paper, costs about 15 cents in computer time.

Dr. H. D. Browning Appointed F-111 AIS Program Director

Dr. Harold D. Browning has been appointed Program Director-F-111 Avionics Intermediate Shop (AIS) at Electronics Division, according to Frederick F. Jenny, Electronics Vice President and General Manager. Dr. Browning comes from the corporation's Fort Worth Division, where he was Program Manager for the F-111 Avionics Update Program.



Browning

In his new position, Browning will lead the company's efforts in obtaining the upcoming Air Force award for replacement of the aging F-111 AIS test equipment. An AIS is a set of automatic test equipment used to test and calibrate electronic systems in high-performance aircraft.

In announcing the appointment, Jenny said, "Dr. Browning brings a wealth of experience in both F-111 and F-16 aircraft and their avionics systems, and he is also familiar with our work on the F-16 AIS, which we have been building for Fort Worth. In the upcoming competition for the F-111 AIS, Dr. Browning's background will be invaluable."

Browning is a graduate of the University of Virginia, and holds Bachelor and Master of Science degrees as well as his doctorate from that institution.

Electronics currently is producing AIS test stations for the F-16 fighter and Hybrid Automatic Test Stations for the Navy's S-3A antisubmarine aircraft.

GD World

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Stickell First To Fly 1,000 Hours in F-16

U.S. Air Force Lt. Col. R. Dean Stickell became the first pilot to log one thousand hours flying the F-16 Fighting Falcon.

When Lt. Col. Stickell landed his Fighting Falcon at Hill AFB, Utah, on September 28th, he was congratulated by Col. Randy O'Neill, Commander of the 388th Tactical Fighter Wing (TFW) and ground crewmen. Also attending the event were representatives of General Dynamics and Pratt & Whitney, which produces the multirole fighter's F100 turbofan engine.

T.S. Webb, Fort Worth Vice President for F-16 Programs, presented Stickell a plaque commemorating the important milestone and Stickell's association with the F-16 program since 1973.

"This is a great airplane," Stickell said during the brief ceremony. "From a fighter pilot's standpoint, this is the airplane I would want to go to war in, and from the taxpayer's point of view — because I am a taxpayer, too — we are getting great value for our money with the F-16.

"If you ask a pilot what he wants most in a fighter, he will say, 'Give me an airplane I can see out of, that maneuvers well and has a high thrust-to-weight ratio.' This airplane has it."

Stickell, 40, is Commander of the 16th Tactical Fighter Training Squadron (TFTS) at Hill and has logged more than 4,000 flying hours in a variety of fighters including the F-100, F-104, F-4 and F-16 in the U.S., England and Southeast Asia.

He became an important figure in the F-16 program even before the aircraft's maiden flight and before the Air Force selected the single-engine fighter. Stickell participated in the Lightweight Fighter Feasibility Study which examined two prototype aircraft—the YF-16 and YF-17 — as candidates for Air Force service.

Following selection of the YF-16 in January 1975, he served as Chief of Operations during the F-16 Developmental Flight Test and Evaluation program at Edwards AFB, Calif.

Stickell joined the 388th TFW as operations officer for the 16th TFTS in December 1978, a month before the 388th became the first operational wing in the world to begin flying the F-16. He assumed command of the 16th TFTS in May 1979.

A native of Frederick, Md., Stickell soloed on his 16th birthday, received his private pilot's license at the age of 17 and followed through with his commercial pilot's rating on his 18th birthday. He is a graduate of The Citadel, Charleston, S.C., and earned his master's degree at the University of Southern California. He joined the Air Force in 1963.



Lt. Col. Dean Stickell

Stored for 10 Years, Redeye Missiles Score Direct Hits

Sixteen Redeye missiles, in military storage for at least 10 years, have successfully demonstrated outstanding reliability by scoring direct hits on 16 aerial targets during a recent military training exercise.

Redeye, a manportable shoulder-fired anti-aircraft missile, was developed by Pomona for the U.S. Army. During the period from 1965-1975, several thousand Redeyes were produced and deployed worldwide. Redeye enables soldiers and marines to destroy enemy aircraft and helicopters.

Redeye requires no support crew or equipment in the forward area and can be operated by one man. However, a normal crew consists of a gunner and team chief.

Initially, a target is detected by the naked eye. Audible signals indicate when infrared acquisition of the target has been made. Taking a lead on the aircraft, the gunner depresses the firing trigger when the aircraft is within range.

The first stage of the rocket motor ejects the missile and the second stage propels it to the target. Once the Redeye is launched, there is no further action

required by the gunner.

As Redeye entered production in 1965, an evolutionary process began. Engineers studied new design concepts and started initial testing of components that would

Tomahawk Makes First Night Flight In Cruise Missile Test Program

The first night flight of a U.S. Navy/Convair Tomahawk land-attack cruise missile was conducted over the White Sands Missile Range in New Mexico the evening of September 19th.

After launch from a Navy A-6 aircraft, the missile flew a complex mission making multiple passes over a simulated ground target. The missile then flew to a recovery area where its parachute recovery system was activated and the missile floated safely to the ground.

The test was the fourth time that the required high accuracy was achieved by using the Navy-developed Digital Scene Matching Area Correlation (DSMAC) guidance system. DSMAC supplements the Terrain Contour Matching System (TERCOM) which guides the missile to

ultimately be integrated into improved manportable air defense systems, such as Stinger, now in production at Pomona, and Stinger-POST, now under development.

a designated location. Once inside that location, DSMAC is used to zero the missile in on the target.

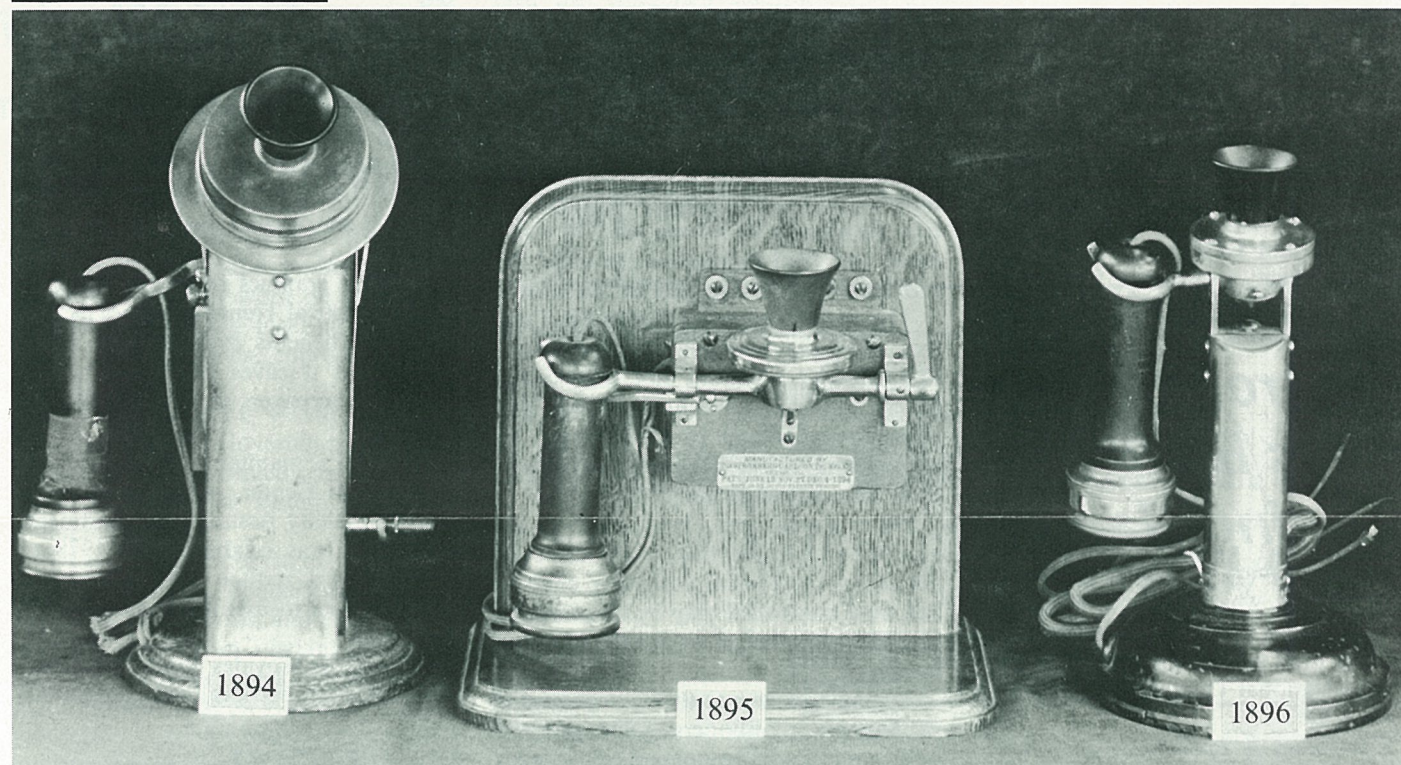
All conventional land-attack Tomahawk cruise missiles are equipped with the DSMAC system and an illuminator which provides light to the system allowing it to operate as if it were daylight.

Dividends Declared

The General Dynamics Board of Directors declared a regular quarterly dividend of 18 cents per share on the company's common stock, and \$1.0625 on its Series A preferred stock, payable to shareholders of record on October 16, 1981.

The dividend on both classes of stock will be payable on November 16, 1981.

GD Flashback



The Farmer's Telephone (at left) Established Stromberg-Carlson's Reputation for Quality

The Farmer's Telephone Answered a Market Need

Losing telephone service when it rains may seem like a strange situation today, but farmers in the Midwest in the mid-1890s learned to live with that flaw in their communications.

The reason for the flaw was simple. Some of the early telephone systems cleverly eliminated the need for special wires and poles by using existing barbed wire fences. Unfortunately, when the rain fell on the uninsulated barbed wire, the service went out.

Supplying the equipment for these rural systems was the chief business for two Swedish-born telephone makers, Alfred Stromberg and Androv Carlson, in the early years of their partnership in Chicago. The most important item in their line was their first telephone, developed in 1894.

Stromberg and Carlson formed their partnership that year for the express purpose of building a better telephone, but they were not alone. Alexander Graham Bell had patented the first telephone in 1876, and many independent telephone companies sprang up after the Bell patents expired in 1893 and 1894.

The simple principle of the telephone, as perfected by Bell, was the use of electricity flowing over a wire and varied in intensity by the human voice.

Stromberg and Carlson thought they could produce a better telephone than Bell's, so they each put up \$500 and got to work.

Stromberg had worked for the Chicago Bell Telephone Co. after immigrating to the United States, and the two partners made sure that their telephone did not duplicate the design of any other existing telephone.

This was a wise move, because the partners avoided the common practice of patent infringement, a mistake made by many of the other independent telephone companies. It put Stromberg and Carlson at a competitive disadvantage, but they were able to stay clear of expensive litigation and concentrate on developing their own equipment.

Before coming to America, Stromberg had been associated with L. M. Ericsson, a Swedish telephone pioneer, and the Stromberg-Carlson phone was designed along Swedish lines. It was a magneto-operated transmitter and receiver that was "wonderfully sensitive" to the transmission of sound. It proved ideally suited to farmers' needs, and the successful first venture by Stromberg and Carlson soon became known as "The Farmer's Telephone."

Users reported that, when listening through it, they not only could hear background conversation in their neighbor's house, but they also could hear the crowing of roosters and the grunting of pigs outside their neighbor's door.

Stromberg and Carlson and other independents aimed at the rural customer, mostly in the Midwest, because Bell specialized on the lucrative city markets, leaving the rural areas as an untapped market. Farmers, however, were beginning to appreciate the luxuries and conveniences of the growing industrial society; and so they began demanding their own phone service, providing a market for equipment supplied by the independent manufacturers.

Mutual phone line associations were formed, with rural communities using existing barbed wire fences or stringing their own wire along public highways. They connected 20 or more phones on a single grounded circuit, and the users called each other by means of a series of long and short rings.

In this development, Stromberg-Carlson "Farmers' Telephones" gained wide popularity because of their technical excellence, and the firm was on its way. The original Stromberg-Carlson telephone is preserved today at the corporation's Orlando, Fla., headquarters.

The telephone proved to be a major factor in breaking down the harsh isolation of rural life as the independent telephone movement spread throughout the rural areas and then expanded into the towns.

Stromberg-Carlson, in the meantime, progressed from a partnership to a company and expanded and improved its lines of equipment. Since their telephone was still the main item, Stromberg and Carlson boasted in their catalog that "We know that it is not any Handy Andy who can make a telephone of this kind" — they were right.

Veliotis Named Ex. V.P. Marine, International

Tovar Appointed General Manager At Electric Boat

P. Takis Veliotis has been appointed Executive Vice President-Marine and International Operations of General Dynamics, a new position that includes responsibility for the company's ship-building programs and for a planned major corporatewide expansion and development of international business.

"This appointment is very important in the long-term growth planning of this company," said David S. Lewis, Chairman and Chief Executive Officer. "Because of his extensive international experience, we have for some time planned to have Takis Veliotis active in this area."

"We were unable to implement this plan earlier because Veliotis' leadership was essential if Electric Boat was to meet the extremely challenging goals of delivering the first Trident ballistic missile submarine and six 688-class, fast-attack submarines in the year of 1981," Lewis said. "This has largely been accomplished."

In this organizational change, Lewis said Veliotis will no longer be responsible for the day-to-day management of Electric Boat, but he will be responsible for the division, Quincy Shipbuilding Division, General Dynamics Services Company, the Corporate International Department and the new International Business Development Department.

Lewis also announced that Fritz G. Tovar will succeed Veliotis as General Manager of Electric Boat. Tovar has been serving as General Manager of Quonset Point (R.I.) facility, where he will be succeeded by William W. Bennett.

Veliotis, 55, joined General Dynamics in 1973 as President and General Manager of Quincy Shipbuilding. He has been General Manager of Electric Boat since October 1977 and was named Executive Vice President-Marine in February 1980.

Tovar, 58, joined General Dynamics in 1975 as General Manager of Charleston (S.C.) facility of Quincy Shipbuilding. In 1977, he was transferred to Electric Boat's Quonset Point facility as General Manager.

Bennett, 40, began his career with General Dynamics in 1977 as Industrial Relations Manager for the Charleston facility. He has served for the past four years as Assistant General Manager at Quonset Point.

The headquarters for the Executive Vice President-Marine and International Operations is expected to be located in the Boston area, initially at Quincy Shipbuilding.

Delivery of Ohio Seen as Proud EB Milestone

Electric Boat delivered *Ohio*, the free world's largest submarine and the nation's first Trident submarine, to the U.S. Navy on October 28th.

The 560-foot long, 18,750-ton vessel officially joined the fleet during commissioning ceremonies on November 11th at the shipyard.

Ohio is the lead ship in a class that will be the country's first line of defense into the 21st Century, and the significance of its delivery brought many comments and congratulations to Electric Boat and its submarine builders:

From Senator Claiborne Pell, Democrat of Rhode Island: "I am delighted that seven years of hard work have borne

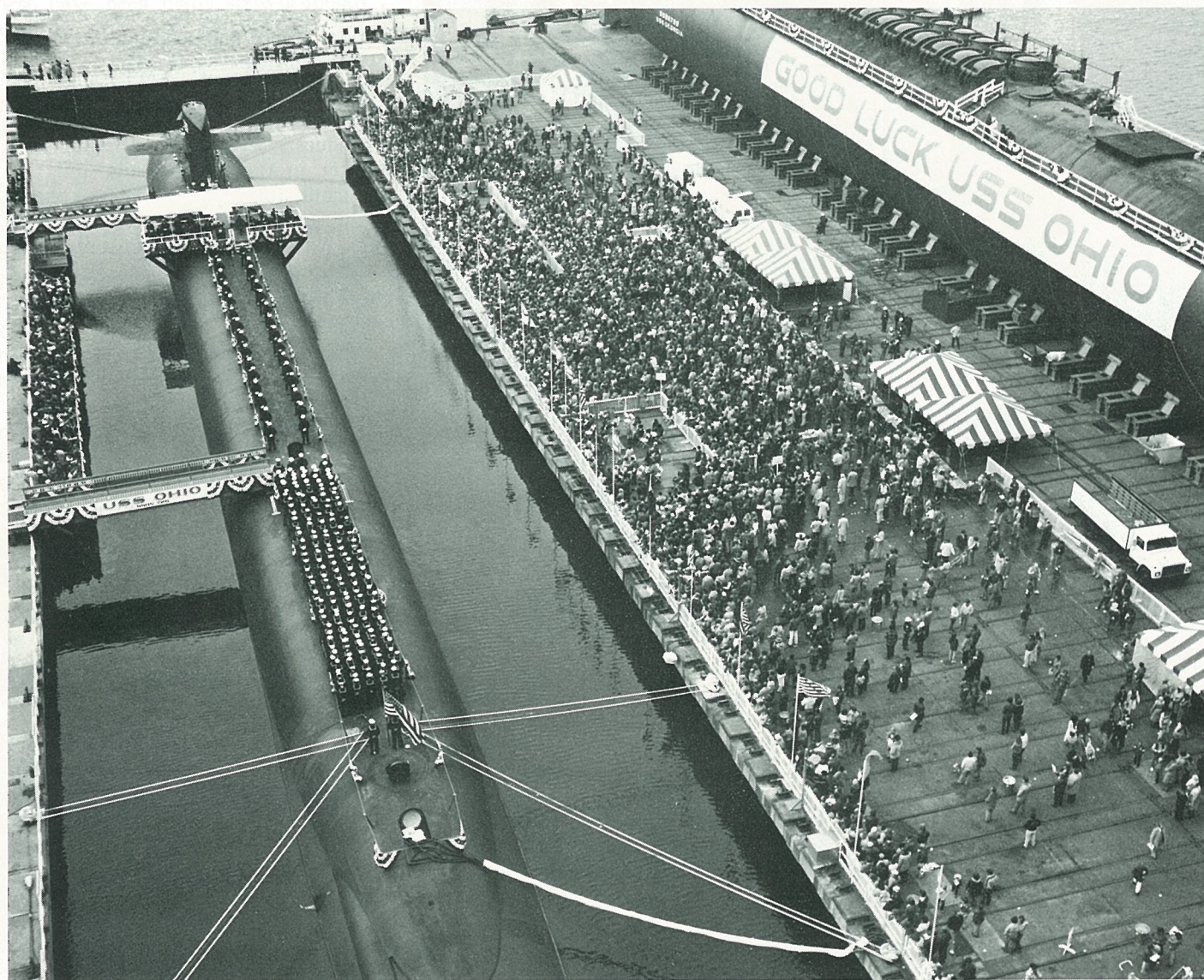
Continued on Page 4

GD World

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November 1981



Joins Fleet. The *USS Ohio* (left), the most advanced submarine ever constructed in the Free World, officially joined the U.S. Navy fleet during ceremonies attended by thousands

of shipyard workers, their families and guests at Groton on November 11th. *Ohio*'s sister ship, *Georgia*, displays a parting message.

USS Ohio Commissioned at Groton

The U.S. Navy's most powerful under-sea weapon, the *USS Ohio*, was commissioned and joined the fleet during ceremonies at Electric Boat on Veterans Day.

Vice President Bush, keynote speaker for the event, told a crowd of about 8,000 persons that the nation's first Trident submarine "introduces a new dimension in our nation's strategic deterrence."

The Vice President added that the *USS Ohio* "represents the latest commitment of the people of the United States to peace. If she is successful in her life's mission, she will never fire a shot."

Secretary of the Navy John F. Lehman Jr. told the dignitaries and guests that "Our Trident submarines are deterrence personified, and if deterrence fails, they are weapons systems of awesome power." Lehman said the first Trident is an uncommonly vivid symbol of the nation's new strategy of maritime superiority.

The 560-foot *USS Ohio*, largest and most deadly submarine in the Free World, was resting in the graving dock of the Electric Boat's Land Level Submarine Construction Facility which was built specifically for the construction of the Trident class of ballistic missile firing submarines.

The huge, black submarine laid beside a large striped tent. Flags and pennants flew, and a ceremonial guard of 30 sword-carrying officers in dark blue uniforms and gold braid stood above the ship's 24 Trident ballistic missile tubes. Nearby, a massive sign, saying "GOOD LUCK USS *OHIO*," was tied to the side of the hull of the *Georgia*, the fourth Trident submarine.

The second Trident, the *Michigan*, is drawing close to her sea trials, and the third, the *Florida*, was launched at Groton November 14th.

"The *Ohio*, and the others of her class, add a special element to our deterrent posture: stability," Bush said. "She will

be highly invulnerable to preemptive strike. That invulnerability threatens no one, except a power who would try a disarming first strike. This emphasizes our desire not to threaten war, but to prevent war, and our desire to add stability to our strategic relationship with the Soviets."

Congratulating the workers at Electric Boat on their job of producing the submarine, he said, "On behalf of the President and the people of the United States, I want to extend our gratitude — for their skill, for their determination and for their hard work."

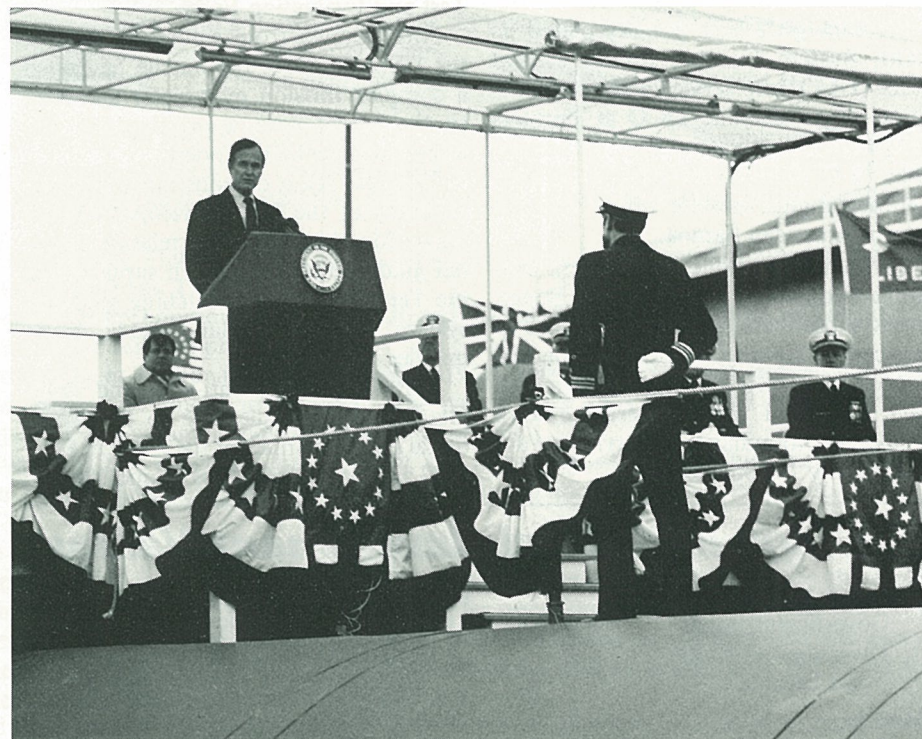
And speaking of the mission of the huge ship, Bush said, "The *Ohio* will violate no sovereign waters, threaten no in-

nocent peoples, carry out no aggression. She will, in the tradition of her breed, run silent and deep — an instrument not of war but of our will to live free and in peace."

The *USS Ohio* (SSBN 726) displaces 18,700 tons and carries 14 officers and 142 enlisted men. She has two complete crews, Blue and Gold, which will alternate on 70-day patrols.

After a shakedown cruise in the Atlantic and the Caribbean, the *USS Ohio* will return to Groton in April for two months of adjustments. Then a nine-year cycle of 70-day patrols and 45-day repair and testing periods will begin.

The ship's homeport will be a new Trident base in Bangor, Wash.



Keynote Speaker. Vice President George Bush (at podium) delivered the keynote speech at *USS Ohio*'s commissioning, saying that *Ohio* and the other Trident missile firing submarines add stability to the strategic deterrence of the United States.



Mine Dedicated. Virgil E. Peterson (left), Executive Vice President and General Manager of Hoosier Energy Rural Electric Cooperative, Lucian A. Lincoln, President of Freeman United Coal Mining Co., and William J. Taylor, President of the Illinois Central Gulf Railroad, pose for a picture before cutting the ribbon at the dedication of Crown III mine.

Freeman United Dedicates New Crown III Underground Coal Mine

Freeman United Coal Mining Co. dedicated its new Crown III mine in Macoupin County, Ill. on October 7th. During the dedication, tours were conducted into the 373-foot deep mine.

The ceremonies included the cutting of a ribbon by an Illinois Central Gulf 85-car unit train.

At the dedication, Freeman United President Lucian A. Lincoln said "the opening of Crown III reflects the emphasis on growth within Freeman United."

Participants included: Virgil E. Peterson, Executive Vice President and General Manager of Hoosier Energy Rural Electric Cooperative, and William J. Taylor, President and Chief Executive Officer of the Illinois Central Gulf Railroad, as well as labor, civic and governmental representatives.

Construction of the mine began in August 1978, and the first coal was shipped on June 30th of this year. The major portion of the mine's production

has been sold on long-term contract to Hoosier Energy Rural Electric Cooperative in Merom, Ind.

At full production, which is planned for the fourth quarter of 1982, the mine will produce two million tons of coal a year and will employ 550 persons.

Freeman United is constructing a surface mine at Industry Ill., which is expected to begin operation in the spring of next year. Currently, Freeman has five underground and two surface mines.

Sub-Launched Tomahawk Scores Hit on Land Target

A Convair-built Tomahawk cruise missile scored another hit on a land target on October 27th in a flight that began with a submarine launch off the southern California coast and ended at the Tonopah Test Range in Nevada.

The test marked the third time a Tomahawk had made a direct hit on a land target.

It was one of a series of combined developmental/operational tests under the direction of the Joint Cruise Missile Project office and the Navy's Operational Test and Evaluation Force.

After launch from a torpedo tube of the USS *Guittaro*, the missile navigated a complex mission over water and land to the target area approximately 300 miles from the launch point.

This test again demonstrated the high accuracy of the Navy-developed Digital Scene Matching Area Correlation terminal guidance system, which supplements the Terrain Contour Matching guidance system used by all land-attack cruise missiles.

The Tomahawk anti-ship and land-attack cruise missiles are to be operational on submarines of the Navy in early 1982 and on surface ships in mid-1983.

33 F-16s Delivered in October, Production Ahead of Schedule

Thirty-three F-16 fighters were delivered to the air forces of six nations during October, setting a new monthly delivery record and eclipsing the record 29 that were delivered in May.

The record delivery from assembly and flight lines in Fort Worth and from the coproducers, S.A.B.C.A. in Belgium and Fokker in the Netherlands, put the multinational program 18 aircraft ahead of the schedule that was established in 1975. A total of 567 multimission F-16s had been delivered as of Oct. 31st, compared to 545 stipulated in the original contract.

While virtually all F-16s have been delivered ahead of schedule, the cost of the aircraft has stayed within the contract limits set when the nations of Belgium, Denmark, Norway and the Netherlands agreed to join the U.S. Air Force in the purchase and General Dynamics in the coproduction of the fighter.

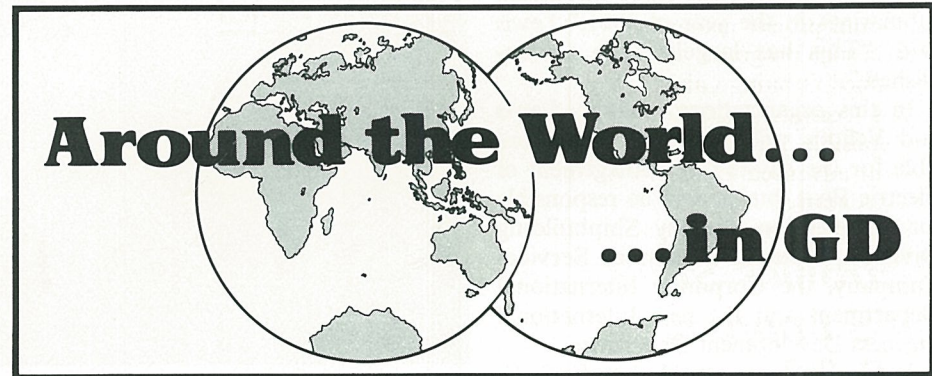
Israel was the sixth nation to add the F-16 to its air force, and in October, the 75th and final fighter of the Israeli Air

Force's initial order was delivered a month ahead of schedule.

At the end of October, Fort Worth had delivered eight F-16s ahead of schedule, S.A.B.C.A. was six ahead and Fokker had delivered four more than the schedule called for.

"I think it is nothing short of fantastic that this five-nation coproduction effort is going so well," said Dr. Ted Webb, Vice President for F-16 Programs. "This is extremely important to NATO since the F-16 is the alliance's most advanced new resource. I think a great deal of credit must go to our coproducers in Europe. It is heartening to realize that our European industrial partners are manufacturing aircraft of such high quality, on time and on cost, during their first involvement in the production of a first line U.S. military fighter."

Webb also had high praise for the division's production team which delivered 42 F-16s in September and October, 17 each month to the USAF and four in those two months each to Israel.



CHQ: David L. Guinan and Donald Wallace Jr. joined as Auditor . . . Lawrence Fournier as Corporate Marketing Manager, Far East . . . Alan R. Buchrucker and Timothy Halterman as Supervising Senior Auditor . . . William H. Persky transferred from Fort Worth and was promoted to Corporate Manager, Safety & Environmental Health.

Fort Worth. A. D. Bowlds was promoted to Engineering Program Manager . . . W. D. Bristow Jr. to Assistant Project Engineer . . . J. F. Buckley to Logistics Group Engineer . . . H. L. Chase to Financial Supervisor . . . C. Davis to Night Manager . . . A. R. Dry and D. Jellison to Field Engineer . . . R. P. Hora to Business Manager — Electronics Products . . . T. Kersey to General Supervisor Production Control . . . W. R. Ledbetter to Logistics Supervisor . . . D. L. Pederson and G. T. Strickland to Logistics Engineer . . . J. L. Penke to Field Service Engineer . . . B. D. Tomlinson to Project Numerical Control Engineer . . . W. H. Tucker to Industrial Engineer, Senior . . . T. Walker to Manufacturing Control Supervisor . . . Glenn A. Long transferred from Data Systems Division and was promoted to Computer Services Specialist.

Convair: Robert F. Frederick was promoted to Group Engineer . . . Robert B. Tomlinson to Designer . . . Richard F. Gibb, Donald S. Thibault and Melville B. Watling to Operations Supervisor, Manufacturing . . . Clara Kurschner to Operations Supervisor, Manufacturing Control . . . Thomas M. Parmarter to Operations General Supervisor — Manufacturing . . . Robert C. Risley to Chief, Estimating . . . John L. Sinnott to Operations Administrative Chief.

Pomona: J. L. Cagle was promoted to Production Control Supervisor . . . C. E. Frazier to Industrial Engineer . . . J. F. Kleinfelter to Facilities Specialist Senior . . . C. A. Turner to Quality Assurance Specialist . . . M. A. Bencomo, L. D. Blum and J. A. Mecca Jr. to Project Representative . . . S. K. Gordon, R. J. Peterson and G. S. Shelton to Section Head . . . F. Hernandez to Property Administrator . . . J. L. Stecker to Project Coordinator . . . G. R. Vanus Jr. to Assistant Project Engineer . . . B. S. Weiss to Material Cost Analyst . . . D. H. Paxton to Superintendent, Fabrications at Camden . . . A. G. Womack to Plant Engineer at Camden and B. C. Lewis to Manufacturing Engineer at Camden.

Electric Boat: Harry Ashbey was promoted to Production Audit Administrator . . . Ronald Meisel to Design Services Supervisor . . . Mark Wagner to Shift Superintendent . . . Paul Fontaine, John MacNeil, Fred Chester and William Lyman to Engineering Supervisor . . . Allan Labrecque to Foreman . . . Thomas Miller to Trade Planning Supervisor . . . Roland Roy and David Weller to Purchasing Agent . . . Kenneth Seidel to Ship Safety Officer . . . Thomas Bartunek to Chief of Security . . . Howard Donahue to General Foreman . . . Raymond Filosa to Chief of Design . . . Richard Mow to Chief of Radiological Control Training and Technical Support . . . Stanley Bugaj to Supervisor of Quality Systems . . . Stanley Fraiser and Harry Skiles to Chief of Engineering . . . David Schweitzer to Supervisor, Engineering.

GDSC: W. H. Harkins was promoted to Deputy Director of Administration . . . W. A. Daly to Manager, Construction/Facilities . . . C. A. Johnston to Director, Program Requirements, Saudi Arabia.

Datagraphix: Sam I. Engelman was promoted to Material Control Supervisor . . . Hal G. Johnson to Senior Program Control Analyst . . . Robert E. Parker to Manager, Support Services — ANEW . . . Al L. Clarke to Regional Systems Specialist . . . Mark Lelek and Garnet E. Bremner to Production Scheduler Senior . . . Joseph K. Mitchell to Systems Specialist . . . Martin L. Sanchez to Production Planning Specialist . . . Christy R. Bonner to Supervisor, Marketing Administration . . . Robert G. Brito to Manager, Marketing Support Services . . . Leland A. Dykes to Branch Manager — Sales . . . Kenneth A. Layton to Production Control Supervisor . . . Charles M. Rowlands to Manager, Marketing Operations.

Savings and Stock Investment Values				
Salaried		Sept. 1979	Sept. 1980	Sept. 1981
Government Bonds		\$ 2.2214	\$ 2.4397	\$ 2.6551
Diversified Portfolio		1.5843	1.9671	1.9331
Fixed Income		1.0235	1.1358	1.2494
Hourly				
Government Bonds		\$ 2.2216	\$ 2.4374	\$ 2.6522
Diversified Portfolio		1.6204	2.0068	1.9745
GD Stock		\$22.3750*	\$34.2500*	\$22.2500

* Reflects 2 for 1 stock split of November 1980.

Stinger-POST Seeker Program Improves Productivity, Savings

Pomona has developed 14 advanced manufacturing methods for the Stinger-POST seeker that will increase productivity and lower costs when the system enters production early next year.

The new techniques were developed under a Manufacturing Methods and Technology contract with the U.S. Army Missile Command.

The techniques are being examined to improve Stinger-POST manufacturing processes, assembly methods and testing techniques.

"Our objective for this two-and-a-half year effort has been to look for ways of

Charhut To Direct Convair Advanced Space Programs

D. E. Charhut has been appointed Director - Advanced Space Programs at Convair, reporting to Bill Rector, Convair Vice President & Program Director - Space.

Charhut joins Convair after 23 years at McDonnell Douglas Astronautics Co., where he had a series of significant engineering and project management assignments on such programs as Spacelab and the Manned Orbiting Laboratory.

In his Convair position, Charhut will be responsible for overseeing company efforts in advanced Department of Defense programs, space transportation systems and space technology.

Electronics Starts HATS Improvement For S-3A Aircraft

Electronics Division has begun full scale engineering development on a product improvement program for the U.S. Navy's Hybrid Automatic Test Station (HATS). The stations test avionics on the S-3A antisubmarine aircraft.

Like the company's F-16 Avionics Intermediate Shop (AIS), they are third generation automatic test equipment, able to test avionics equipment over a wide range of functions.

There are Electronics-built HATS aboard most Navy aircraft carriers as well as four shore stations — NAS North Island in San Diego, Calif.; NAS Cecil Field at Jacksonville, Fla.; NAS Alameda near San Francisco, Calif.; and NAS Patuxent River, Md. There is also a test station at Lockheed for S-3A manufacturer support, and the Canadian Ministry of Defense has a station at Greenwood, Nova Scotia, supporting CP-140 Aurora aircraft. The CP-140 has the same avionics as the S-3A.

Electronics also has a contract from the Navy for two additional stations, and another contract for the update of all related technical publications.

ATC Distributor Appointed in Canada

Lenbrook Industries Ltd., with headquarters in Scarborough, Ont., Canada, has been appointed exclusive distributor for American Telecommunications Corporation's (ATC) telephone products in Canada.

The firm has major sales offices in Calgary, Alta. and Montreal, Que.

Lenbrook has established the stocking, service and distribution networks that are required to support the entire line of ATC decorator and character telephones throughout Canada.

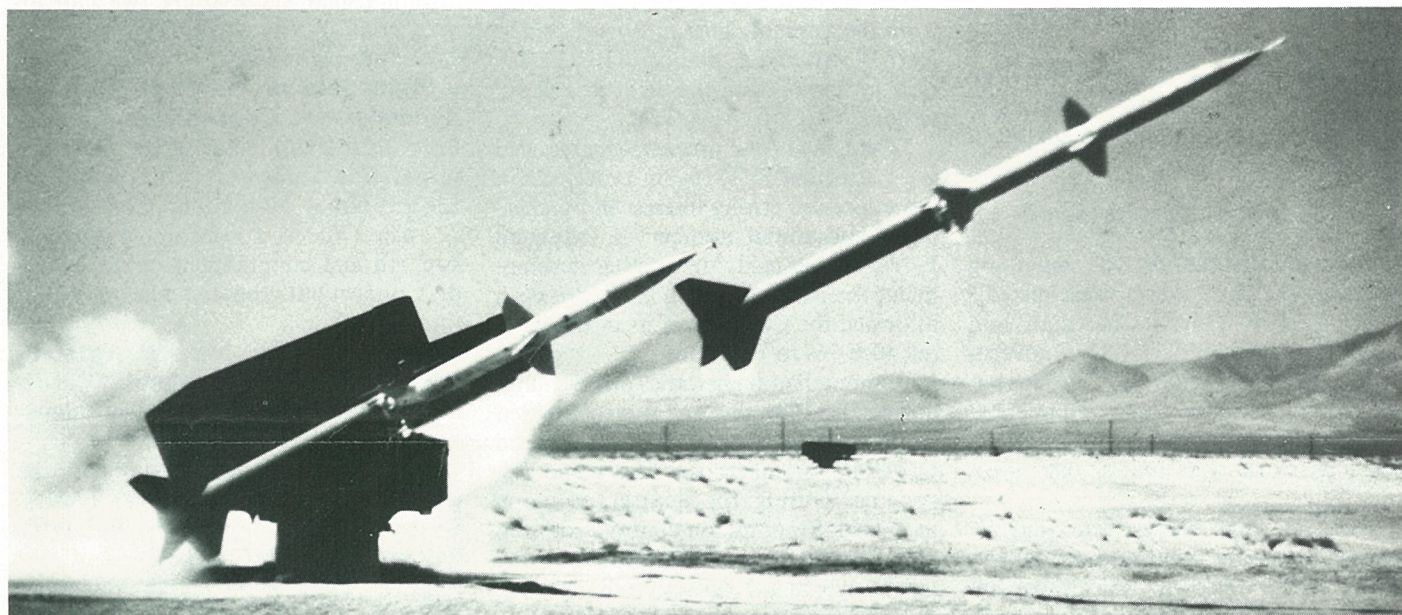
reducing the cost of production, because there have been many state-of-the-art advances, and we're anticipating large production volumes," says Michael J. Crisp, Stinger-POST Project Engineer in charge of the program. "The Army is pleased because we completed the program under budget and have been able to show a significant return on the government's investment," he says.

One of the new techniques involves the use of powdered titanium instead of wrought metal for a part of the seeker. The powder can be pressed closer to the required shape than in the former method of fabrication and saves machining time and material cost.

The contract's criteria for selecting the improved manufacturing methods were improved yields, reduction of tooling and test equipment and general ease of fabrication.

The new methods were used to build, assemble and test six seekers which were delivered to the Army for further evaluation.

GD Flashback



An Early Test Firing of Terrier

Terrier Missiles Began Era in Naval History

Few methods of attack on ships have been as devastating as the feared Japanese kamikaze suicide missions in World War II. The threat was severe and the U.S. Navy began looking for a new weapon to defend its ships — the seed for the guided antiaircraft missile was planted.

At the end of World War II, the Navy's principal long-range antiaircraft weapon was the dual purpose, five-inch gun, but in less than 10 years, it was being replaced by a deadly accurate guided missile produced at Pomona.

The new weapon was the beam-riding Terrier I, a slim, needle-nosed missile which had greater range and accuracy than the five-inch gun it replaced. As the Navy's first tactical antiaircraft missile, the Terrier I provided the primary antiaircraft armament for the world's first guided missile cruiser, the USS *Boston*, and it eventually became the primary ship-to-air weapon on many U.S. warships.

The versatile Terrier I could be fired day or night in all kinds of weather. In an operation that took only seconds, it was selected automatically from the magazine and loaded on the launcher. The missile was automatically trained, elevated and fired, and automatic radar continued to guide the Terrier to the target.

Terrier test firings came close to 100 percent effectiveness, and a statistical analysis showed that despite the seemingly high cost of each missile, Terriers actually cost the Navy less per kill than did conventional guns.

With its solid fuel booster, the Terrier I was 27 feet long, 12 inches in diameter and weighed 3,000 pounds. It was armed with a high explosive warhead.

The development of the Terrier began near the end of World War II with the initiation of the Navy's Bumblebee Program under the technical direction of the Applied Physics Laboratory of Johns Hopkins University. The program's purpose was to develop the technology needed to produce an effective naval surface-to-air missile system, proved necessary by the kamikaze attacks.

In support of the Bumblebee Program, Consolidated-Vultee Aircraft, later Convair Division, built many airframes, guidance and control components and test vehicles between 1945 and 1949.

In February 1949, after aerodynamic, guidance and propulsion techniques were established, Consolidated-Vultee was awarded a contract for the development and production of the Terrier I prototype.

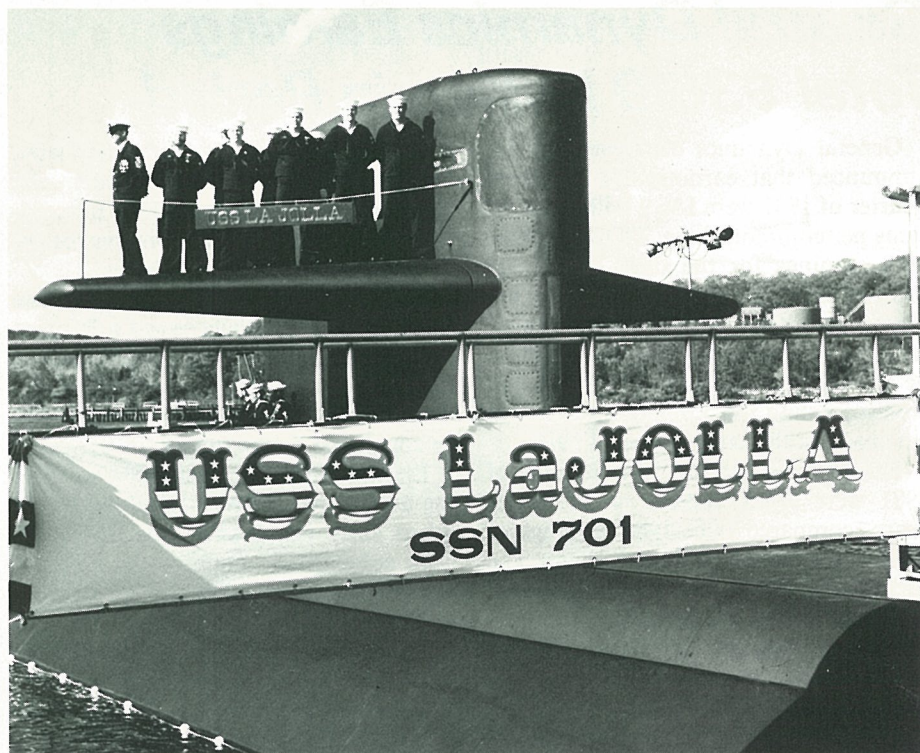
Prior to groundbreaking for the 143-acre facility at Pomona, Calif., in August 1951, Terrier I component production was started at San Diego, but limited operations began at Pomona in mid-1952. The nation's first fully integrated guided missile facility was completed at Pomona in January 1953, and volume production began immediately.

Meanwhile, the first round had been delivered by San Diego on Jan. 31, 1950, and it was flight tested at China Lake, Calif., two weeks later. The prototype of the Terrier I successfully demonstrated the beam-riding guidance of the missile against a drone target.

The Korean Conflict gave urgency to the development of the tactical Terrier, and two light cruisers, the USS *Boston* and the USS *Canberra*, were designated for conversion as guided missile cruisers. (Both ships had been constructed during the early 1940s at the yard that is now Quincy Shipbuilding Division.) Test firings of the Terrier were conducted in 1951 from the USS *Norton Sound*, a converted seaplane tender, off the California coast. The Terrier was so accurate in the tests that the Navy adopted nonexplosive warheads to save the expensive drones. Dummy warheads released a puff of smoke near the target to indicate a kill. However, some of the unarmed Terriers destroyed target planes with a direct hit.

The USS *Boston*, completely modernized from the hull up and mounting two Terrier twin-launchers aft, was recommissioned on Nov. 1, 1955. Each of her launchers could fire two Terriers simultaneously. The Terrier I was so soundly designed and ruggedly built that not one had a malfunction in the first five months of its service on the *Boston*. The Terrier-armed *Canberra* was recommissioned in 1956, and the rush was on to install Terriers on U.S. aircraft carriers, cruisers, destroyers and frigates.

In 1956, continued development of the Terrier I resulted in the supersonic Terrier II, which doubled the performance of its predecessor, and the family of Pomona-produced missiles was firmly established.



Number Four! Crewmen at parade rest await the start of commissioning ceremonies for LaJolla (SSN 701) at the Submarine Base in Groton, Conn., October 24th. The ship was the fourth Electric Boat-built 688-class sub to join the fleet this year. Still to be delivered in 1981: two sister ships — Phoenix (SSN 702) and Boston (SSN 703). Both are currently undergoing sea trials.

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General Dynamics Earnings Total \$36.9 Million in Period

General Dynamics on November 6th announced that earnings for the third quarter of 1981 were \$36.9 million, or 67 cents per common share. This compared with earnings for the third quarter of 1980 of \$51.7 million, or 95 cents per share. The 1981 third quarter earnings reflected tax credits totaling \$6.5 million, or 12 cents per share, compared to tax credits totaling \$16.5 million, or 31 cents per share, in the same period of 1980.

Earnings for the first nine months of 1981 were \$91.5 million, or \$1.65 per share, compared with 1980 earnings of \$142.4 million, or \$2.62 per share. The earnings for the first nine months of 1981 reflected tax credits totaling \$17.5 million, or 32 cents per share, compared to \$33.2 million, or 62 cents per share, in the same period of 1980.

The tax credits discussed above represent investment tax credits and tax benefits from a permanent deferral of Federal income taxes on profits derived from certain export sales. Earnings in the 1980 periods also reflected the tax credits resulting from the delivery of two liquefied natural gas tankers.

Sales during the 1981 third quarter and nine months were \$1.30 billion and \$3.83 billion respectively, compared to \$1.20 billion and \$3.45 billion reported in the 1980 periods.

Funded backlog at the end of the third quarter of 1981 was \$10.1 billion, with total funded and unfunded backlog at \$10.7 billion.

Operating Results Mixed

"As in the first half of 1981, operating results for the third quarter were mixed," said David S. Lewis, Chairman and Chief Executive Officer. "Our government business remained very strong, but earnings in several of our commercial operations continued to be adversely affected by world-wide recessionary pressures."

Lewis said high interest rates and the sluggish economy continued to depress results in the telecommunications and data products group, and earnings from commercial shipbuilding and commercial aircraft programs declined as a result of lower sales levels. Further, a two-month strike by the Operating Engineers Union in Chicago had a very negative effect on earnings at Material Service.

Turning to government programs, Lewis said the delivery on October 28th of the nation's first Trident ballistic missile submarine, the *Ohio*, to the U.S. Navy was "without question the most important program milestone of the year for General Dynamics."

"The *Ohio* demonstrated excellent performance during her sea trials, exceeding virtually all of the planned specifications," Lewis said.

The *Ohio* (SSBN 726) was commissioned on November 11th during cere-

monies at Electric Boat. Three days later, on November 14th, the third Trident, the *Florida*, was launched. Work is proceeding on schedule in the construction of the six other Tridents on contract.

"Because of this excellent progress, late in September the Navy issued a Request for Proposal to Electric Boat for the ninth Trident," Lewis said. "Contract negotiations for this ship are expected to be completed before the end of the year."

Electric Boat also continued to meet the accelerated delivery schedules established early this year for its SSN 688-class submarines. Four of the six fast-attack submarines scheduled for delivery in 1981 have now been delivered, the fifth will be delivered later this month and the sixth will follow in late December.

"Again emphasizing the good progress at Electric Boat, the Navy announced in late October that it would begin negotiations for procurement of one additional 688-class submarine, with options for three more," Lewis said.

Military Programs Strong

Earnings continued to be led by Fort Worth as the F-16 production program proceeded on schedule. Sixty-seven F-16s were delivered during the third quarter from the assembly lines in Europe and at Fort Worth and a total of 542 F-16s are now in service with the air forces of six nations.

"The Israeli Air Force recently received the last of the 75 F-16s on order, and it has expressed strong interest in purchasing a substantial number of follow-on F-16s," Lewis said. "In another development, the Administration late last month informed the Congress of its intention to sell 40 F-16s to Pakistan."

Pomona had higher sales and earnings during the 1981 third quarter compared to 1980 as it increased production on several important tactical missile and gun systems. During the quarter, Pomona received a \$166 million contract for continued production of Standard missiles, the Navy's major surface-to-air weapon system.

Convair continued to make substantial progress on its various versions of the Tomahawk cruise missile for the U.S. Air Force and Navy. A recent highlight was the first night flight by a land-attack version of the Tomahawk in an operational-type mission that met all test objectives.

Convair's earnings from production of aircraft fuselages for McDonnell Douglas were down during the third quarter as a total of seven DC-10 and KC-10 fuselages were delivered compared to 10 fuselages in the third quarter of 1980.

In the resources area, Freeman United Coal increased its sales and earnings substantially during the quarter while Marblehead Lime showed some slight improvement in results.

Directors of General Dynamics Cite EB's Milestones in 1981

The General Dynamics Board of Directors on November 5th unanimously approved the following resolution:

RESOLVED, that the Board of Directors of General Dynamics Corporation, on behalf of all employees and shareholders of the Corporation, wish to express their deepest appreciation to the dedicated people of Electric Boat who, under the inspired and experienced leadership of P. Takis Veliotis, were responsible for the following outstanding record of achievement in the production of nuclear powered submarines for the U.S. Navy in 1981:

- Delivery of the SSN 698 Bremerton on 13 February 1981.
- Delivery of the SSN 699 Jacksonville on 31 March 1981.
- Delivery of the SSN 700 Dallas on 26 June 1981.
- Delivery of the SSN 701 La Jolla on 29 September 1981.
- Delivery of the First Trident, the SSBN 726 Ohio, on 28 October 1981.
- Work on the SSN 702 Phoenix scheduled for delivery in November 1981.
- Work on the SSN 703 Boston scheduled for delivery in December 1981.

Officials Praise Electric Boat On Delivery of Ohio to Navy

Continued from Page 1

fruit with the delivery and commissioning of the first Trident submarine, the *Ohio*. . . . Giving birth to the first Trident has been an especially challenging and difficult mission and now that it has been accomplished successfully, we can all take pride in this great step forward in submarine technology."

From Senator Lowell P. Weicker, Republican of Connecticut: "The delivery to the U.S. Navy of the *Ohio* is a proud achievement for the people of Electric Boat and all of Connecticut . . . The *Ohio* is a measure of the skill, strength and commitment of the people of Connecticut and the nation whom they serve."

From Senator John H. Chafee, Republican of Rhode Island: "The delivery of the nation's first Trident submarine is an extraordinary moment in history, and an especially proud one for the dedicated men and women of Electric Boat who designed and built this incredibly complex ship. The future of this shipyard has never been brighter and that future is due to the perseverance and achievements of the EB workers."

From Senator Christopher J. Dodd, Democrat of Connecticut: "I share the deep pride felt by the men and women of Electric Boat as the first Trident submarine is delivered to the Navy. The fact that Electric Boat will deliver seven submarines to the U.S. Navy in a single year, despite the skepticism of some, is a tribute to the skill and dedication of the entire work force."

From Representative David F. Emery, Republican of Maine: "The delivery of the SSBN 726 *Ohio* to the Navy is a milestone for the national defense effort. . . . The Trident submarine is a symbol of our firm commitment to re-arm America."

From Representative Samuel Gejdenson, Democrat of Connecticut: "The men and women who work at Electric Boat should be congratulated for

their recent accomplishment. The *Ohio* is a tremendous technological achievement. Its successful completion is a testimony to the talents and skills of the workers at EB and the U.S. Navy."

From Representative Claudine Schneider, Republican of Rhode Island: "With the delivery of the *Ohio*, Electric Boat has set an unparalleled production record — only seven years from start to finish. My congratulations to Electric Boat and its dedicated work force for an outstanding job."

From William A. O'Neill, Governor of Connecticut: "On behalf of the people of Connecticut, it is my privilege to congratulate the men and women of Electric Boat on this historic occasion. The delivery to the Navy of our nation's first Trident submarine, the *Ohio*, is a truly significant milestone in the long and proud history of Electric Boat."

From J. Joseph Garrahy, Governor of Rhode Island: "I want to congratulate the men and women of Electric Boat who have worked so ably and so hard to make possible this truly momentous occasion. The delivery of the first Trident submarine, the *Ohio*, is a milestone in your life and the life of our nation."

From Secretary of the Navy John F. Lehman Jr.: "I am very happy indeed to see the *Ohio* delivered to the Navy. It is a fine lead ship of Trident submarines which will serve the strategic forces of our nation well in the years ahead. The workers and management of Electric Boat should be very proud to have produced such a splendid ship."

From George A. Sawyer, Assistant Secretary of the Navy, Shipbuilding & Logistics: "Having spent more than 48 hours embarked in *Ohio* and observing its performance first hand, I can personally report that it is a remarkable ship. During sea trials, *Ohio* met or exceeded all design specifications and goals. The Navy is extremely proud to have *Ohio* join the fleet."

P.T. Veliotis Receives Honor From Marine Club of Hartford

P. Takis Veliotis, GD Executive Vice President - Marine and Electric Boat General Manager, was awarded the prestigious Gideon Welles Award from the Marine Club of Hartford on November 3d.

The award is named for President Lincoln's Secretary of the Navy who was an editor of the *Hartford Times*. It is presented each year to an individual who has elevated the prestige of the American armed forces. Previous recipients have been President Carter, Secretary of the Navy J. William Middendorf 2d, Texas Governor William P. Clements, Jr., and other distinguished Americans.

The award is a replica of an 1850 Navy cap-and-ball Colt pistol, and is the club's highest honor.

In presenting the award, Ernest Abate, Speaker of the Connecticut House of Representatives, said that Veliotis "has clearly distinguished himself as an individual who has enhanced the prestige of the military services . . ." in his long shipbuilding career.

A telegram from Senator Lowell Weicker, Republican of Connecticut, congratulated Veliotis for his "strength of character, dedication of purpose and the ability to organize and get the job done under difficult circumstances."

Representative Samuel Gejdenson, Democrat of Connecticut, said that he had never seen "a head of a company as large as Electric Boat be as responsive and helpful to a Member of Congress."

Fort Worth Receives AF Contract To Incorporate Jammer into F-16

Fort Worth has received a \$17.4 million contract from the U.S. Air Force for development work leading to the incorporation of the Airborne Self-Protection Jamming (ASPJ) system in the F-16 fighter.

Fort Worth has been working under study contracts with the ASPJ developer, the F-16 System Program Office and the ASPJ System Program Office in defining the most effective integration approach. The resulting configuration will provide excellent electronic countermeasures performance and will allow for growth in the avionics system.

The F-16 Falcon is the first aircraft that the USAF has designated to carry the ASPJ electronic countermeasures (ECM) system.

Currently, the ECM for the F-16 is

carried in a pod attached to one of the stores stations on the aircraft.

The ASPJ, now being developed by ITT and Westinghouse, will consist of seven "black boxes," weighing about 250 pounds. They will be located in the aft equipment bay and in the vertical tail root fairing.

Flight testing is expected to be conducted in 1984 after the system is installed in two modified F-16s, according to Jim Sager, Engineering Chief for the ECM Systems Group at Fort Worth.

The ASPJ is one of several systems and weapons in development by USAF with intended application to the F-16. All F-16s delivered to the USAF after November 1981 will have initial provisions for ASPJ and other new avionics and weapons systems.

Season's



Greetings

The Netherlands Plans to Procure 18 More F-16s

The Dutch Government announced early this month that it plans to purchase another 18 F-16s in addition to the 124 currently on order, and that it ultimately plans to procure a total of 213 F-16s by 1989.

The announcement said that the formal letter of offer and acceptance for the 18 aircraft will be signed by the Dutch and U.S. governments before the end of December.

The Dutch government initially ordered 102 F-16s in 1975 and, in December 1980, placed the first follow-on buy for 22 more. The Royal Netherlands Air Force has now received more than 50 of these aircraft. The aircraft in the most recent order will be delivered between mid-1985 and mid-1986.

According to the announcement, further annual follow-on orders will lead to a complete standardization of the nine Dutch combat aircraft squadrons with one type of fighter, the F-16, in 1989.

All F-16s for the Royal Netherlands Air Force are assembled by Fokker in the Netherlands under the multinational coproduction program entered into in 1975 by the governments of the U.S. and the four European participating governments, Belgium, Denmark, the Netherlands and Norway.

More than 500 F-16s have been delivered to date to the U.S. Air Force and the air forces of the four European countries, with an additional 75 already delivered to the Israeli Air Force.

Pomona Awarded Contract for Viper

Pomona Division has received a \$14.5 million contract from the U.S. Army Missile Command for initial production of the Viper, a lethal, lightweight weapon that will enable an infantryman to destroy modern tanks and armored vehicles.

Viper production was approved after more than five years of intensive development and testing by General Dynamics and the Army. Manufacturing and assembly of the shoulder-fired weapons will be carried out at Pomona's facilities in Camden, Ark., with the first units scheduled for delivery in late 1982. It is expected that production will gradually build up to very high volumes and continue for many years.

Viper is a modern version of the famed Bazooka used by the Army and Marine Corps beginning in World War II. The rocket-powered Viper weighs approximately nine pounds, including its telescoping fiberglass container which also serves as the rocket launch tube.

Navy Awards EB Long-Lead Contract For Ninth Trident

The U.S. Navy has awarded Electric Boat a \$64 million contract for additional long lead-time material for a ninth Trident submarine.

The contract, a supplement to an existing one, is for items such as valves, pumps and other material that need to be ordered before the ship is actually constructed.

The division submitted a proposal for the construction contract on the ninth Trident in October. That contract has not yet been awarded.

GD World

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December 1981



Falcons in Formation over the Pyramids

Eight Hill AFB F-16s Participate In Joint US-Egyptian Exercise

Eight F-16 fighters from Hill AFB, Utah, performed precisely as scheduled during the massive Bright Star '82 exercise in Egypt in November.

The F-16s, which were flown by air crews from the 388th Tactical Fighter Wing, took part in a special demonstration for civilian and military officials from several nations at the conclusion of the joint Egyptian-U.S. maneuvers on November 24th.

During the display, fighters and bombers delivered tons of live ordnance "in a ripple of crackling thunder" on targets scarcely half a mile from the reviewing stands, the *New York Times* reported.

"The F-16s displayed their ability to strike at very low and very high altitudes," the *Times* said. "At one point, several foreign military attaches were futilely scanning the skies for an F-16 that had struck its target from such height and at such speed that it was difficult to spot."

The *Washington Post* reported that "it was the speed flying by F-16s, hitting targets from such distances that often the planes could not even be seen . . . that drew the most comment."

Four F-16As and four F-16Bs arrived at Cairo West AB November 18th after a 7,000-mile flight from Utah with an intermediate stop at Langley AFB, Va., headquarters of the USAF's Tactical Air Command. En route, the Falcons were refueled several times by a KC-10 tanker.

Following their on-schedule arrival, the four F-16As were serviced in less than two hours and flown on an exercise mission to demonstrate the Falcon's excellent turnaround capability.



Honorees. David S. Lewis, Chairman and Chief Executive Officer of General Dynamics, holds the "Sands of Time" Kitty Hawk trophy presented to him recently at the Wright Brothers banquet. With Lewis are, (left to right): Walter F. Beran, President of the Los Angeles Area Chamber of Commerce; Astronaut Robert L. Crippen; Lewis; Astronaut John W. Young, and Dr. Eberhardt Rechlin, President and Chief Executive Officer of The Aerospace Corporation, Honorary Chairman for the event.

Lewis Recipient Of Kitty Hawk Aviation Award

David S. Lewis, Chairman and Chief Executive Officer of General Dynamics, was one of four persons presented with the "Sands of Time" Kitty Hawk award at the annual Wright Brothers Banquet held December 4th in Beverly Hills, Calif.

Other recipients of the award "for significant contributions to the advancement of flight" were Astronauts John W. Young and Robert L. Crippen, pilots for the first flight of the Space Shuttle Columbia, and Lt. Gen. Richard C. Henry, Commander of the Air Force System Command's Space Division.

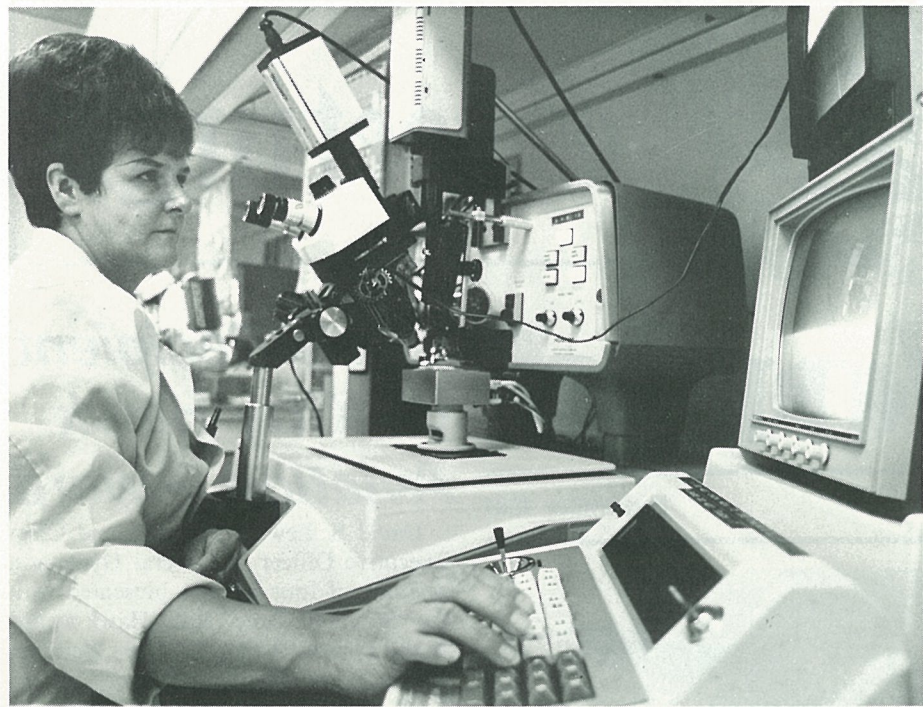
Lewis was honored particularly for his "lifetime of contributions to the aerospace industry."

The 19th annual award ceremony was sponsored by the Los Angeles Area Chamber of Commerce and commemorated the 78th anniversary of powered flight.

In presenting the four trophies, Matthew H. Portz, Director of the Office of Information of The Aerospace Corporation, said that the awardees "have added new dimensions to the field of aviation and aerospace." In his introduction of Lewis, Portz described him as a man who "loves the excitement and the challenge" of his job and whose "achievements in aerospace have been prodigious."

The "Sands of Time" trophy is a symbolic hour glass, reflecting the past and future, and is filled with coarse sand from Kill Devil Hill at Kitty Hawk, N.C., and fine sand from Cape Canaveral, Fla.

Previous recipients include: Olive Ann Beech, Chairman of the Board of the Beech Aircraft Corporation; Adm. Thomas B. Hayward, USN, Chief of Naval Operations; Robert F. Six, Chairman of the Board of Continental Airlines; Gen. James H. Doolittle, USAF (retired); Lt. Gen. James T. Stewart, USAF (retired), and a number of American astronauts.



Bonding Microscope. Irene de la Rosa is one of four Pomona employees trained with the Hughes Automatic Wire Bonder which can bond gold wires, smaller than human hairs, into hybrid microelectronic assemblies.

Wire Bonding Is Like Attaching 200 Human Hairs to a Fingernail

Three new machines in Pomona's Microelectronics Manufacturing Department are proving valuable time savers in the complex process of wire bonding.

According to Len Hermanns Jr., Manufacturing Development Engineer Senior, operators can bond wires in a complex hybrid microelectronic assembly in just minutes with Hughes Automatic Wire Bonder machines — it used to take them two hours. A complex assembly is one with more than 200 wires.

The machines automatically bond a gold wire one-thousandth of an inch in diameter to connect an integrated circuit chip to the substrate, the circuit film on which the chips sit, or to connect the substrate to a header pin. The header pins let electronic signals pass in and out of the microelectronic assembly.

With the new machines, operators view the whole process with a microscope and a display screen, which magnifies the picture from 10 to 70 times. The magnification is necessary because the wires, finer than human hair, are bonded to chips a quarter the size of a fingernail.

Pomona brought the first machine on board a year ago, and within the last six months, two more have been added. A

Rapid Deployment Deputy Commander Visits Electronics

Electronics Division was host to U.S. Air Force Maj. Gen. Robert C. Taylor, Deputy Commander of the Rapid Deployment Joint Task Force, during his recent visit to San Diego.

Gen. Taylor toured the Management Information Center, which provides management with daily status reports on all F-16 Avionics Intermediate Shops (AIS) in the world and received a briefing on the recent Harvest Bare deployment of an AIS shop to Wendover, Utah.

During that deployment, a complete F-16 AIS shop was set up and operated for a month in a bare base environment in temporary buildings, a situation similar to what the Rapid Deployment Force would encounter if sent into an area of the world without fixed bases available to the United States.

fourth machine is scheduled to arrive at the end of this year.

The machines work only on hybrid microelectronic assemblies used in Standard Missile-1 and Standard Missile-2. Eventually, the machines will be used on the Stinger-POST program, where hybrid assemblies have from 600 to 1,000 wires. Along with saving time, the machine reduces the possibility of error, especially in complex assemblies of 400 wires and more, where it is easy for an operator to miss a single wire and not notice the error until electrical test.

The bonding process uses a combination of heat and ultrasonics that is called thermosonics. The tip of the instrument makes contact with the bonding area and the gold wire vibrates at frequencies of approximately 60 kilohertz. The wire is rubbed so rapidly into the bonding areas that heat is generated and a mechanical bond forms.

Fixed Income Fund Interest to Average 11.5 Percent in 1982

The effective annual yield on the Fixed Income Fund of the Savings and Stock Investment Plan will increase in 1982 from 11.2 percent at the beginning of the year to approximately 11.8 percent at year end.

As a result, money invested in the Fixed Income Fund will earn an average yield of approximately 11.5 percent in 1982.

The 1982 yield will be increased despite recent, sharp declines in yield on savings certificates, bonds and other investments.

The Fixed Income Fund is designed to provide a competitive, stable return from year to year, with a cushion against declining interest rates. When the fund started in 1979, the rate of return was 9.5 percent. This has increased steadily and in 1981 reached 10.75 percent.

"Although a stable return will not always equal the highest yields available, especially when yields surge to the record levels of 1981, over the long term, the Fixed Income Fund will provide a very competitive return," said Lawrence N. Doreson, Corporate Manager-Employee Benefits and SSIP and Labor Counsel.

Savings and Stock Investment Values			
Salaried	Oct. 1979	Oct. 1980	Oct. 1981
Government Bonds	\$2.2271	\$2.4364	\$2.7293
Diversified Portfolio	1.4977	2.0053	2.0562
Fixed Income	1.0315	1.1354	1.2607
Hourly			
Government Bonds	2.2272	2.4342	2.7269
Diversified Portfolio	1.5324	2.0454	2.0998
GD Stock	\$22.6900*	\$32.9375*	\$26.5600

* Reflects 2 for 1 stock split of November 1980.

Third Trident Is Christened Florida At Electric Boat

A high-ranking Defense Department official said during the launching ceremonies for *Florida* at Electric Boat on November 14th that Trident missile-firing submarines are "the single most powerful weapons system the U.S. has ever developed."

Speaking before a crowd of 6,000 during christening ceremonies for the *Florida* (SSBN 728), the nation's third Trident submarine, Deputy Defense Secretary Frank Carlucci called the huge ship "the most invulnerable leg of the Triad, capable of operating for extended periods without detection."

Secretary Carlucci said that the nation's commitment to build the Trident "should serve to warn our potential adversaries that we will be prepared to defend our freedom," adding that "this superb submarine also symbolizes the great strength of our free society. . . ."

Carlucci said the Reagan administration is committed to "meaningful, balanced and verifiable arms reductions," but added, "We will only have meaningful arms reductions . . . if the Soviets recognize that the West will not disarm unilaterally."

P. Takis Veliotis, Executive Vice-President Marine and International Operations, welcomed spectators and guests: "Let me assure you," Veliotis said, "that we are fully committed to achieving Trident's production and delivery goals in the months and years ahead."

The company delivered the first 560-foot, 18,750 ton Trident, USS *Ohio*, in October and has seven more under construction. *Ohio* joined the fleet during commissioning ceremonies on November 11th.

Following Carlucci's address, his wife, Marcia, christened *Florida*. With the words, "In the name of the United States, I christen thee *Florida*. May God bless her and all who sail in her," she smashed a bottle of champagne on the ship's superstructure.

Also speaking at the ceremony were Adm. Thomas B. Hayward, Chief of Naval Operations, U.S. Rep. Charles E. Bennett, Chairman of the House Seapower Subcommittee, and David S. Lewis, General Dynamics' Chief Executive Officer and Chairman of the Board.



Bottle Smash. Florida (SSBN 728), the third Trident submarine, is christened by Marcia Myers Carlucci.

**Around the World...
...in GD**

CHQ: Jon E. Gunderson and Susan S. Schumack joined as Auditor . . . Joseph Giangulio joined as Senior Auditor . . . John R. Lopez Jr. transferred from Fort Worth and was promoted to Corporate Marketing Manager-Venezuela . . . Arthur J. Cohen was promoted to Corporate Manager, Consolidation Accounting.

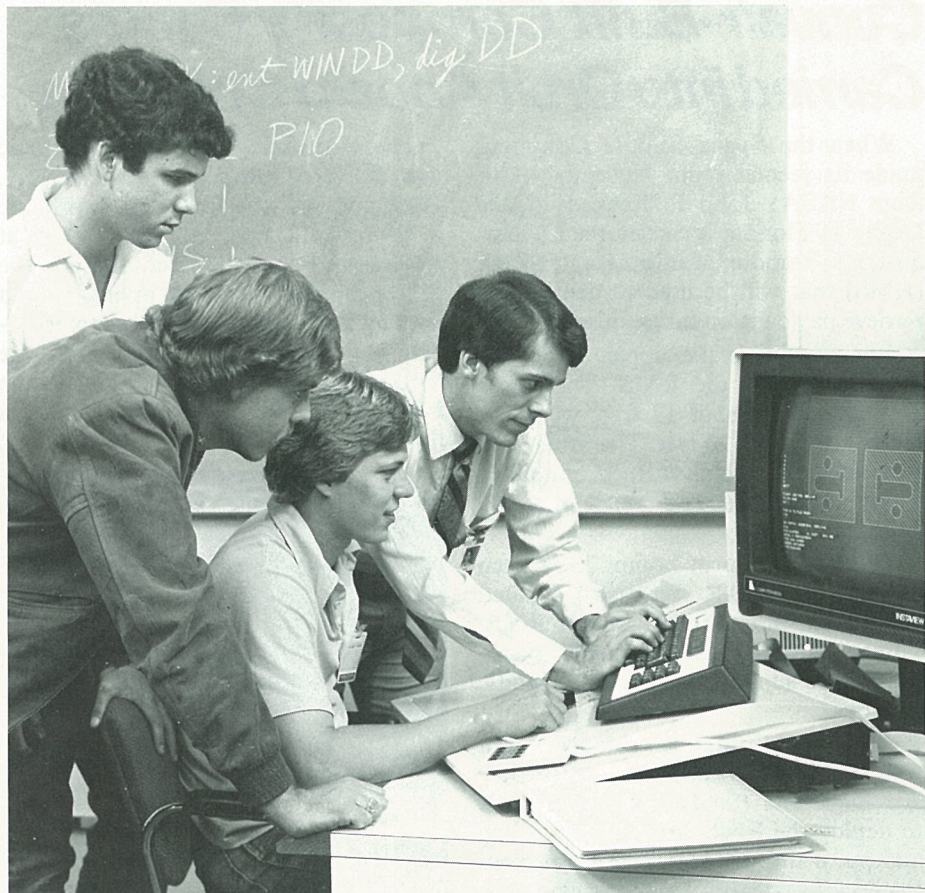
Convair: Edward J. Beveridge was promoted to Engineering Chief . . . Robert R. Martin to Program Manager . . . Hugh Reynolds to Group Engineer . . . Gerald V. Smith to Engineering Manager . . . Thomas E. Thompson to Material Operations Supervisor . . . Larry A. Mattson to Superintendent . . . Gary A. Mongelluzzo to Operations Supervisor-Manufacturing Engineering . . . Ronald M. Thomas to Operations General Supervisor-Manufacturing Control.

Fort Worth: G. R. Blankenship was promoted to Chief of Industrial Engineering . . . A. G. Brucks to Engineering Chief . . . M. J. Buchanan and J. A. Mitchell to Logistics Group Engineer . . . R. A. Capshaw to Project Manager . . . B. A. Garrett, D. R. King and P. D. Plumlee to Foreman . . . M. P. Griffin to Chief of Subcontract Management . . . W. H. Hilliard Jr. to Program Estimator, Senior . . . B. J. Jiles to Logistics General Supervisor . . . F. L. Kelly Jr. to Engineering Program Manager . . . R. B. Leighton and M. I. Rowe 2d to Financial Analyst . . . W. C. Livingston to Director of Division Productivity . . . M. J. Marcellus and R. L. Stevens to Field Service Engineer . . . R. E. Matthews to Chief of Quality Assurance . . . C. A. Matteson to Logistics Specialist . . . J. E. Miller to Manufacturing Technology Engineering Specialist . . . M. A. Ogg to Senior Field Service Engineer . . . J. F. Storm to General Foreman . . . C. W. Street to Logistics Supervisor . . . S. Strickland to Quality Assurance Engineering Specialist . . . D. M. Tye to Manager-Field Service Support . . . C. Wood to Principal Field Service Engineer . . . J. D. Wruble to Financial Specialist . . . W. B. Zimmerman to Director of Product Support . . . F. C. Ketter to Change Proposal Supervisor.

Electronics: W. A. Carlson was promoted to Section Head . . . Thelmon Copeland to Principal Manufacturing Engineer . . . James D. Damico to Manager, Training and Development . . . Pat H. Dean and R. G. McKellips to Industrial Relations Representative . . . Michael Jorgens to Product Test Supervisor . . . Clifton Marsh to Plant Engineer . . . Andrew Millman to Field Engineer . . . Steve A. Parent to Supervisor.

ATC: Connie Bloem was promoted to Manager, Marketing Administration . . . Gwen Griffin to Supervisor, Purchasing . . . Ron Morrell to Manager, Engineering.

Pomona: R. E. Colling was promoted to Engineering Group Supervisor . . . L. G. Davies to Project Administrator . . . R. J. Jones Jr. and W. E. McNabb to Chief, Cost Control . . . P. McCray to Senior Project Engineer . . . J. W. Nuechterlein and H. L. Enriquez to Quality Assurance Specialist . . . R. H. Peterson to Assistant Project Engineer . . . E. A. Schara to Facilities Specialist . . . T. D. Thielo to Plant Engineering Supervisor . . . P. C. Cunningham Jr. and W. M. White to Project Representative . . . J. W. Enos to Quality Assurance Specialist, Senior . . . J. L. Kalland and D. C. Tubbs to Project Coordinator . . . K. M. Kutyla to Contract Specialist . . . K. A. Lober, G. P. Vaughan and J. K. Stasik to Manufacturing Control Supervisor . . . R. F. McConnell to Group Engineer . . . B. J. McIntosh and S. Surlita to Production Control Supervisor . . . P. E. Woodward to Procurement Representative.



Electronics Campus. Mark Tabor (right), a mechanical engineer in Electronics' CAD/CAM facility, instructs three San Diego State University engineering students in the use of the computer-aided design equipment. Electronics is cooperating with SDSU by providing the facilities for a CAD/CAM laboratory.

Electronics Hosts CAD Course For San Diego State Students

What began as Mark Tabor's desire to take a couple of graduate engineering courses has led to the formation of a cooperative program between Electronics Division and the San Diego State University Department of Mechanical Engineering.

Tabor, a mechanical engineer in Electronics' Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) facility, discovered that the school's engineering department did not have a CAD/CAM laboratory for training its students in what is becoming a major design and engineering technique.

With the cooperation of Ken Bonine, Electronics Division CAD/CAM Manager, Tabor suggested a program which would utilize Electronics' facility one

night a week for a course in Engineering Drawing.

Ten students are in the course this semester, primarily freshmen and sophomores from all four of the university's Engineering Department's major areas of mechanical, electrical, aerospace and civil engineering.

Professor Robert L. Bedore, Chairman of the Mechanical Engineering Department, said the cooperative program "does a lot for the students. It provides them not only with an awareness of a first-line application in industry, but it also gives them hands-on experience with equipment that the university cannot afford to purchase right now."

"For myself, it is very meaningful to see how to set up a CAD/CAM program, and what equipment students need."

Bonine says that while the Electronics equipment is in use all three shifts, there is time available on the second shift without affecting division work at this time.

There are many company benefits to the program. Bernie Kulchin, Director of Industrial Relations, said, "Cooperation with the university not only improves our overall recruiting climate at San Diego State, it also provides us a future pool of trained graduates who are familiar with our equipment and with some of our people."



Franklin

The appointment carries a promotion to the rank of Major General for Franklin, who has been serving as Assistant Adjutant General of the California National Guard since August 1980.

Franklin began his career with General Dynamics in 1948, and he enlisted in the California National Guard the same year. He received his commission in the Guard in 1954.

Franklin graduated magna cum laude from National University and holds a master's degree from United States International University where he presently is a doctoral candidate in human behavior. He is also a graduate of the Army War College. He was on active Army duty from 1976 to 1980.

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Electronics Receives Excellence Certification for F-16 AIS Work

Electronics Division has been awarded a Certification of Supplier Excellence from Fort Worth Division for the F-16 Avionics Intermediate Shop (AIS).

The award is based on the continued High Supplier Quality Rating which Fort Worth uses to judge the performance of all of its suppliers and subcontractors. The rating system covers five categories of performance, and Electronics received perfect scores in final inspection, corrective action and product audits, with an overall rating of 98.8 percent.

During the presentation of the award plaque to Frederick F. Jenny, Vice President and General Manager of Electronics, Dorsey J. Talley, Fort Worth

Vice President of Quality Assurance, cited the outstanding support by Electronics during the recent delivery of the AIS shops to Hahn AB, West Germany.

At Hahn, which will be the next USAF base to receive the F-16, two shop sets of seven stations were received, unpacked and set up and power was applied in 2 hours and 43 minutes. Electronics has delivered 110 shop stations supporting the F-16 worldwide.

During November, the division received additional praise from another customer. A message from the Naval Air Systems Command cited the hard work, long hours and high degree of cooperation that led to the planning and execution of a complex series of accuracy tests on the Cooperative Tracking System (CTS) at the Naval Weapons Center at China Lake, Calif. These tests were a major milestone prior to the at-sea evaluation of the system scheduled for February 1982.

The CTS is a part of the Mobile Sea Range being installed at Point Mugu, Calif., which will extend the U.S. Navy's test range over the horizon into the Pacific Ocean.

Blanchard Named Vice President For Datagraphix

James A. Blanchard has been named Vice President-Product Operations for Datagraphix, Inc. In his new position, Blanchard will be in charge of the purchasing of materials, material requirement planning, receiving, traffic and supplies operations, as well as product shipment planning. He will also supervise the microfiche reader plant and all Datagraphix plant engineering.

Blanchard began his career with Datagraphix in 1969. In 1976, he was promoted to Manager of Purchasing, and, in 1978, he was promoted to Manager of Corporate Purchasing for General Dynamics.

15 Employees Honored by Electronics As Outstanding Achievers in 1981

Fifteen dedicated employees from Electronics were honored last month as the division's Outstanding Achievers for 1981.

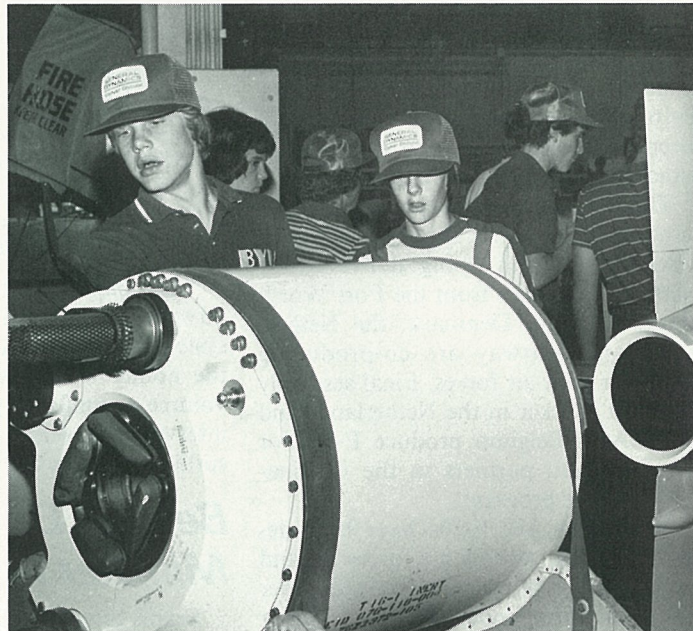
Recognized for their exceptional performance during the past year were: H. A. Beard, J. C. Boyle, D. G. Burnett, L. M. Diaz, J. P. Dunham, T. L. Hamen, V. R. Hampsten, K. J. Hyvonen, J. Y. King, C. List, V. Nye, F. E. Plumley, J. H. Poirier, C. J. Webster and R. L. Williamson.

Electronics General Manager Frederick F. Jenny, citing "the outstanding achievements and fine work accomplished by 15 very special people," presented each achiever a certificate and personal memento. Prior to the awards presentation, each Outstanding Achiever was introduced by his supervisor who gave a brief overview of the individual's performance during 1981.

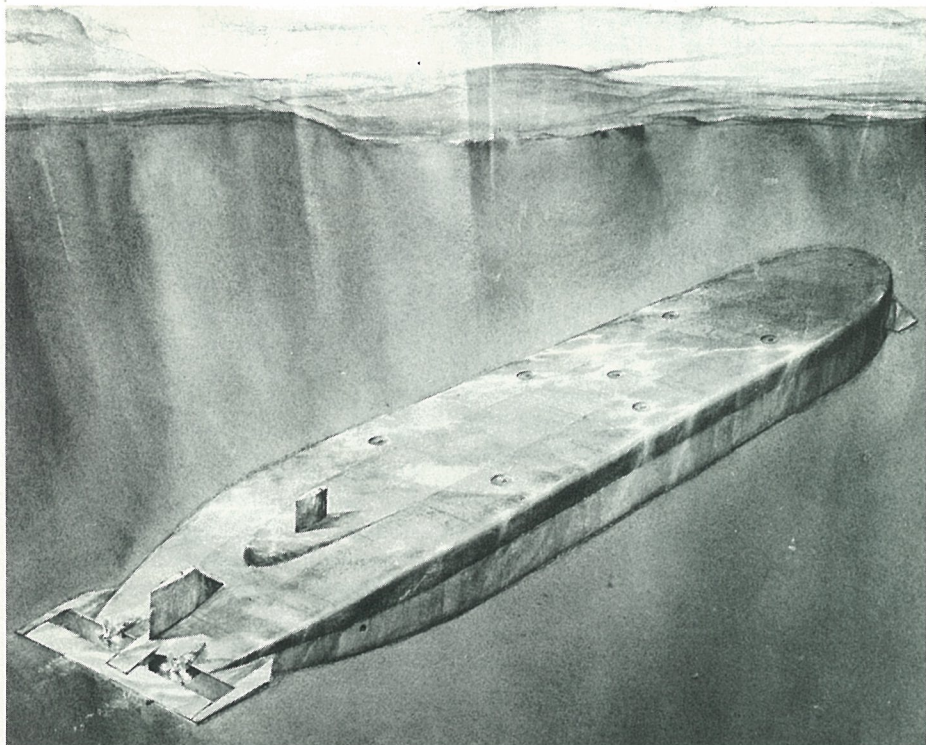
The 15 who were cited were chosen from a select group of 40 nominees as candidates for the award.



Open House. More than 13,000 people visited Convair's Kearny Mesa, Lindbergh Field and Plant 19 facilities November 21st during an open house for employees, their families and friends. The visitors saw an impressive display of facilities and products including cruise missiles, Atlas and Centaur launch vehicles, the Space Shuttle orbiter midfuselage, DC-10/KC-10 production, 767 struts and advanced technologies such



as composite structures. General Manager Dr. L. F. Buchanan, said, "My thanks to all the members of the open house committee, the National Management Association Convair Chapter, the Convair Recreation Association, and all the employees who joined together to man the displays and carry out all the other details necessary to make this an impressive and successful open house."



An Artists Concept of an LNG Submarine Tanker

Submarine Tanker Proposed To Transport LNG from Arctic

General Dynamics has proposed a multibillion dollar concept for German-American cooperation in transporting liquefied natural gas (LNG) by submarine tanker from the Arctic to North America and Western Europe.

Announcement of the proposal was made at a news conference in New York on November 18th by James J. Murphy, Marine Group Vice President-Marketing, and Spencer Reitz, Deputy General Manager of Electric Boat.

Murphy said the company had received "enthusiastic" encouragement from the U.S. Departments of State, Commerce and Energy and is holding discussions with major German shipbuilders and other industry representatives who might share in the project.

The concept centers on a fleet of 28 massive submarine tankers, each about 1,400 feet long. The ships would carry LNG in 341-foot cylindrical tanks with a total volume of 140,000 cubic meters. The tankers would load in Prudhoe Bay, Alaska, at submerged cargo stations and unload at surface terminals in North America and Europe or onto surface tankers for transshipment to existing facilities.

The plan, which calls for construction of the tanker fleet and support facilities in the United States and West Germany,

75th Israeli F-16 Completes Order One Month Early

The U.S. Air Force has accepted the 75th F-16 fighter aircraft for the Israeli Air Force from Fort Worth completing the foreign military sale of the fighter one month early.

Under the Peace Marble program, 67 single-seat F-16As and eight two-place F-16Bs were produced. Almost all of the aircraft already have been delivered to Israel by U.S. Air Force pilots.

The early delivery of the last F-16 for Israel coincides with the increase to 15 aircraft a month being delivered by General Dynamics from the Fort Worth plant. Belgium, Denmark, the Netherlands and Norway are co-producing F-16s for their air forces. Final assembly plants at Fokker in the Netherlands and SABCA in Belgium produce F-16s for the European partners in the multinational fighter program.

More than 550 F-16s have been delivered to the various air forces around the world. Egypt has 40 aircraft on order for its air force under the Peace Vector foreign military sales program. Deliveries of Egyptian F-16s will begin in the first quarter of 1982.

The first Israeli F-16 was formally delivered in January 1980 and flown to Hill AFB, Utah, where Israeli pilots and maintenance crews were trained.

would be the largest of its type ever undertaken. A multinational consortium would finance, build, operate and manage the proposed project.

Reitz emphasized to reporters that the proposal is "state of the art" and entirely feasible.

Murphy said the concept, when implemented, would require a \$20 billion investment in both the United States and West Germany. He said this could generate revenues in excess of \$70 billion on both sides of the Atlantic over 25 years.

The construction phase, Murphy said, could provide jobs for an estimated 42,000 persons in the United States and Europe for 11 years, while the operational phase could provide work for about 12,000 persons in the United States and Europe for 25 years.

Some of the submarine production work would be performed at General Dynamics facilities in Quincy, Mass., Charleston, S. C., and Quonset Point, R. I., and Electric Boat would take part in design activities.

General Dynamics has designed two versions of the tanker, one nuclear-powered, the other non-nuclear. The non-nuclear version, which would operate on methane, would be 1,470 feet long. The nuclear version would be 200 feet shorter. Each would have a beam of 228 feet and a depth of 92 feet. They would be operated by crews of 32.

Projected cost per ship would be \$700 million for the non-nuclear version, \$725 million for the nuclear model. The nuclear version would cruise at three knots faster than the non-nuclear one (15 as opposed to 12).

The project was announced initially on October 22d when P. Takis Veliotis, Executive Vice President-Marine and International Operations, and Reitz presented a paper on the project at the Gastech '81 LNG/LPG Conference and Exhibition in Hamburg, West Germany.

Their paper asserted that the primary advantage offered by a submarine system over a surface ship system was the ability to deliver a constant cargo volume at uniform, predictable schedule intervals the year round, regardless of surface ice and weather conditions.

Belgian Defense Minister Flies F-16

Frank Swaelen, the Defense Minister of Belgium, recently made his first flight in an F-16 at Beauvechain Air Base, the home of the Belgian Air Force's 349 Squadron, the first operational F-16 unit in Europe. He made the flight with the 349 Squadron Commander, Maj. Victor Mardaga.

Convair-Built Composite Booms Carried into Orbit Aboard Columbia

When the Space Shuttle Columbia made its second flight November 12th from NASA's John F. Kennedy Space Center in Florida, it carried the Canadian-built Remote Manipulator System (RMS) that will be used to deploy and retrieve payloads on future missions.

Convair builds the upper and lower arm booms for the RMS. The upper arm measures about 17 feet, while the lower arm spans 20 feet. The arms were fabricated from high-stiffness graphite/epoxy composites and weigh only 103 pounds.

Three sets of arm booms have been delivered to SPAR Aerospace Limited of Canada, prime contractor for RMS. Three additional sets are being manufactured to support future Space Shuttle missions.

Although Columbia's second flight was shortened to 54 hours, Astronauts Joe Engle and Richard Truly were able to deploy the RMS from the cargo bay and put it through special test programs to check its operation and movements in space. NASA has reported that these tests were successful.

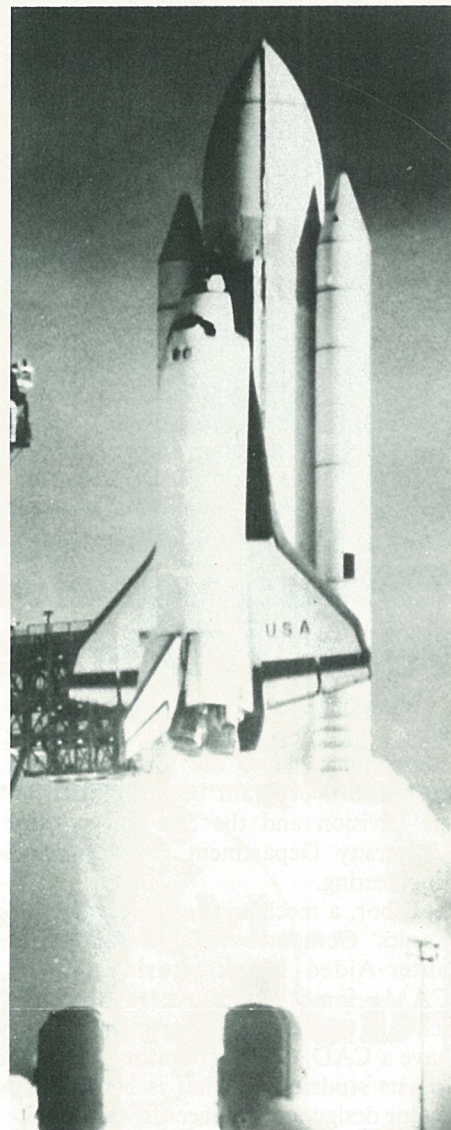
In addition to the parts for the RMS, Convair built the 60-foot long payload bay of the Columbia.

In discussing the challenge of designing the cargo bay, Lloyd Munson, Convair's Shuttle Orbiter Midfuselage Program Manager, said one of the prime goals was to minimize weight. Company-funded studies led to the adaptation of honeycomb structured side skin panels and lightweight boron/aluminum tubing to reduce the weight of the structure.

"On the Columbia," Munson said, "we bettered our target weight by trimming approximately 1,300 pounds from the midfuselage."

Under subcontract to Rockwell International, Convair has delivered midfuselage sections for the Enterprise, Columbia and Challenger space vehicles, and the division is working on two others — Discovery and Atlantis.

The midfuselage for the Enterprise was delivered on schedule March 21, 1975, and was the first major structure to go into the final assembly fixture at Rockwell's Palmdale, Calif., facility. The Enterprise was used for approach and landing tests from atop a specially modified 747 aircraft. The structure for the Columbia was delivered on schedule February 9, 1977. It made its maiden flight last April.



The Columbia

Keel of Coal-Carrying, Coal-Fired Ship Laid at Quincy Ceremony

The keel for the first coal-carrying, coal-fired ship to be built in the United States in more than 25 years was laid at the Quincy Shipbuilding Division November 16th.

The 655-foot ship, being constructed for New England Electric, is scheduled to begin operation in 1983. It will carry 2.2 million tons of domestic coal per year from ports along the eastern seaboard to New England Electric's generating stations in Southern New England.

Guy W. Nichols, Chairman and Chief Executive Officer of New England Electric, principal speaker at the event, said it was appropriate the ship "which will carry domestic coal to New England for the benefit of New Englanders, is being built here in Quincy by New Englanders."

"This ship," Nichols continued, "will play an important role in New England Electric's plan to reduce our use of expensive foreign oil by converting power plants to coal."

Earlier, Quincy General Manager Gary Grimes had welcomed the 100 or so guests. "This new ship," Grimes said, "represents an important part of the answer to the question of how we can make the best and most cost-effective use of an abundant American energy resource"

"She will do everything expected of her," Grimes continued. "That's because she will be Quincy-built — and as we all know, that's the best thing you can say about a ship."

Highlight of the ceremony came when Joan T. Bok, Vice Chairman of New England Electric, welded her initials into the keel section, the first of 158 construction units that had been placed in the huge building basin.

Also on hand for the ceremony were Joseph S. Fitzpatrick, Massachusetts Secretary of Energy, and Adolph Kurz, President of Keystone Shipping Company, which will operate the \$60 million ship jointly with New England Electric.

FAA Awards Contract for Testing Structures Bonded with Adhesives

The Federal Aviation Administration (FAA) has awarded Fort Worth a contract to develop a system for testing the adhesive strength of bonded and composite components in military, commercial and private aircraft.

The structural strength screening system is based on a prototype developed by Fort Worth's Materials Research Laboratory and uses high-power ultrasound to generate stress waves.

The technique disrupts weak bonds without affecting the sound bonds.

Adhesively bonded structures have been used in both military and commercial aircraft for two decades, but there has not been an inspection technique that guarantees the strength and integrity of the components, according to Dr. Francis Chang, Senior Engineering Specialist and Program Manager of the FAA contract at Fort Worth.